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ON FEVER

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A
TREATISE
ON
FEVER

OR

SELECTIONS FROM A COURSE OF LECTURES ON FEVER

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Being Part of a Course of Theory and Practice of Medicine delivered by

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AND TO

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I DEDICATE THIS VOLUME

OUT OF RESPECT FOR THEIR EMINENT SERVICES TO THE CAUSE OF

MEDICAL EDUCATION

AND IN ACKNOWLEDGMENT OF PERSONAL FAVORS

ROBERT D. LYONS

PREFACE.

I AM induced to publish this work on Fever, with a view to bring within the reach of the Student and Junior Practitioner, in a convenient form, the more recent results of inquiries into the Pathology and Therapeutics of this formidable class of diseases.

The works of the great writers on Fever are so numerous, and in the present day are scattered through so many languages, that they are difficult of access, not only to students, but also to practitioners. I shall deem myself fortunate if I can in any measure supply the want which is felt in this respect.

As it would not be possible to embrace in a single volume all the varieties of Fever, I have thought it best to deal only with those forms of the disease which are of most practical importance.

R. D. L.

8, Merrion Square West, Dublin:
December 27th, 1860.

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OUTLINES OF FEVER

CHAPTER I.

GENERAL OBSERVATIONS.

We commence to-day the study of the most remarkable and the most important class of diseases to which the human kind is liable.

In its varied history, Medicine presents nothing which more forcibly arrests our attention, than the great fever epidemics, notices of which are to be found in the records of all ages, and in the annals of every race and people. And when, as in more recent times especially, we are enabled to realise, by numerical estimate, a full and accurate conception of the vast extent to which fevers prevail in great epidemic visitations, it becomes evident that the study of this dire scourge of humanity, with a view to the possible mitigation of its ravages, constitutes a social as well as a medical problem of the highest importance.

In all times we find the great masters of our art labouring assiduously and devotedly in this grand work, the import of which they well knew—few in the present day better than Sydenham in the eighteenth century.

If you desire to follow in their footsteps, you must emulate their learning and zeal, and their devotion to their art. And truly a great task lies before you, great in its purposes, noble in its ends. It ranks second to but one: that which ministers to the glory of our Maker.

By far the most important of the duties to which you will be called, when you pass into the world as practising physicians, no matter in what clime your lot may be cast, will be those which will devolve on you in connection with the treatment of fevers.

"Et profecto haud oscitanter impugnandum est hoc morborum tam pestiferum agmen, quod nullo non die cum genere humano bellum gerit internecinum atque ἄσπονδον et cujus telis duo ad minimum hominum trientes (si eos demas qui violentâ morte pereuntur), confossi quotannis occumbunt."

In the words which I have here quoted from Sydenham, that great observer states, that excluding deaths from violence, fevers constitute nearly two thirds of all the diseases by which mankind perishes annually. And I believe that this statement is hardly in any way to be regarded as an exaggeration for his day. It is not perhaps in the generations of men that pass silently away by disease, as it invades the homes of the poor year after year, that its effects are most terribly felt, and most strikingly manifested. It is in the midst of war's mingled triumphs and alarms, when the false pride, or the insulted honour of nations, or the love of conquest, pits against each other the flower of their youth on the battle-field, that disease, and pre-eminently febrile disease, makes its most deadly havoc. To take no other example, I think I should be justified in saying that considerably more than half of the whole deaths of that splendid army of over 300,000 men which France supplied in the late Russian war, was caused by fevers, or the diseases secondary to fevers. The whole of the French losses by injury and diseases in the Crimean campaign, may be taken at very close to 70,000; the report of the French Minister at War gives the numbers at 66,000. On the side of England 10,000 men of the flower of the British army were carried off by disease in seven months, in the first winter's campaign in the Crimea. From the 1st September, 1854, to April 1855, 4,228 men perished from disease in the hospitals of Scutari alone, of whom but 359 died of wounds. Accurate figures are out of the question, and were unattainable even on the spot; but from my own personal observation, I am induced to believe that an immense proportion of these deaths was the result of fever and the diseases secondary to fever. When dealing with the subject of typhus, I shall perhaps be induced to give you some brief historic notices of the great ravages committed within the present century, and at the close of the past, by the terrible fever epidemic known as the *Kriegs-pest*, or war plague, and which, originating in the great armies that then turned the plains of Europe into a series of vast slaughter-houses, continued to ravage camp and battle-field, cities and country districts, for many years subsequently.

But if we want the most striking evidence from figures, of the terrible waste and destruction of life involved in great fever epidemics, we need not go beyond the records of our own country, in which, for ages, the typhus has had its home.

At no time, as it would seem, within the historic period in Ireland, has a century passed unmarked by one, or, it may have been, more visitations of this fatal pestilence, so long ineradicably domesticated amongst us.

Since the national devastation which resulted from the protracted and exhausting wars of the sixteenth and seventeenth centuries, the epidemic recurrence of fevers would seem to have assumed a more fixed and determined periodicity. Thus, for the last two hundred years, almost every quarter of a century has been signalised by a more or less fatal invasion of these diseases. Indeed, so nearly fixed and definable seem the laws which govern the movements of the great epidemics of this country, that we can almost with certainty predict their return, like that of some ill-omened meteor of the olden time. And experience of the past shows us, that it is far from an improbable prediction, that ere a score or two of years shall have passed over our heads, we may be again called upon to combat a pestilence as wide-spread and as fatal, as that which will ever make the last decades of our social history remarkable. Our own century has already witnessed not less than three epidemic visitations of first-class magnitude and fatality.

Let us take a glance at the numerical results which the reports and investigations of the Census Commissioners of Ireland have brought to the illustration of this subject. You will see that it is not only in the last decade that fever has had a large share in raising the per-centage of our mortality to an alarming height.

According to the census of 1841, the total deaths from fever in the ten years then elapsed, or the decade 1831–1841, reached the enormous number of 112,072.

Large, however, as these figures are, we find that they are all but doubled by those which represent the mortality, from fever alone, in the subsequent decade, that of 1841–1851. This period was, as you are all doubtless well aware, made remarkable by the terrible epidemics of 1847, 48, and 49. The number of deaths from fever solely, for the whole ten-year interval, 1841–1851, amounts to no less than 222,029! And this return, you must bear in mind, takes no cognisance of the many thousands who perished by the wayside, or in the lone deserted cabin, untended and uncared-for in the general moral prostration that paralysed the sympathies as well as the energies of all. Thousands there were, as we all well know, who thus passed away uncounted and unrecorded, and whose deaths would swell the great mortuary roll of that decade, far beyond even its present terrifying proportions. Another great element is omitted, and necessarily so, from the calculations of the Census Commissioners; I refer to the number of those who, in the general panic of emigration which then seized on so many thousands of our people, bore with them from their Irish homes the seeds of the pestilence, which ripened into fatal maturity, between the crowded and stifling decks of the emigrant ship, or upon the hospitable shores of the country of their adoption, carrying death and desolation to all with whom they held intercourse on their landing.

But even if we confine ourselves to the consideration of the mortality from fever, as furnished by the census returns, what an awful subject for contemplation is there presented! Again, what a fearful contingency is it not to anticipate, not only as possible, but as not improbable, that hundreds of thousands of the very flower of our race may be destined to fall victims to fresh visitation of this dire pestilence, ere the present quarter of a century shall have elapsed! None can say that such will not be the case. Indeed, many are convinced, and I am not indisposed to share in the conviction; and I would even venture to say, regardless of the *μάντι κακῶν*! which meets all such prophecies of ill omen, that as far as human experience goes, it is all but certain, that this century will not close without one, or it may be more, typhus epidemics, similar, if not superior in extent and malignity, to that from the dire effects of which we have but just recently emerged.

Let us inquire what proportion this enormous number of deaths from fever bore to those from all other diseases. We find that during the past decade, 1841–51, the deaths from dysentery, though next in order, amounted to only 93,232. Thus the deaths from fever were more than double those from dysentery; while to the total specified causes, the deaths from fever were in the proportion of 1 to 5·5.

Now, if the deaths from fever be assumed to be only as one to three of those affected with the disease, we should have the number of those attacked within the decade, greatly over half a million. More than one-sixteenth of the population would thus have gone through the epidemic. No such calculation can, of course, be accurate; but it will give you no unjust view of the enormous responsibilities, the duties, and the cares which devolve on those who constitute the medical body in this country. In no way can you get a more full conception of the importance of the mission which they are called upon to fulfil.

If you are destined to be practitioners in Ireland, certain I am that much of your practice will be in fever cases; and that as fever patients, the highly prized lives of the lords of the soil, and in sight of God the not less prized lives of his poorer creatures, your own peasant fellow-countrymen, will again and again be in your hands: with what zeal and energy should you not prepare for these trusts!

But you must likewise remember that it is not alone in times of great epidemic visitations that you will have to combat this "*morborum tam pestiferum agmen*" in this country. For I believe it admits of no doubt, that in its worst forms, the maculated typhus, or Irish typhus,—for by this name it is now almost universally known amongst European nosologists—is never, on any given day, in any given year, entirely absent from a greater or less extent of the city or country districts of Ireland. It is, in fact, and has long been *endemic* amongst us, in the fullest sense of the word. In the natural history of the disease, and as an appendage to any definitions of the typhus, systematic nosographers must henceforth add the words, "*chief habitat, Ireland.*" As Irish practitioners, it will manifestly be your first and most essential duty to make yourselves masters of all that science furnishes to us respecting the pathology and therapeutics of fever.

But even should your avocations be exercised in other lands, whether as public servants in any of the distant colonies or broad possessions of the British Empire, or as adventurers seeking new homes and fortunes in the Far West, your knowledge and your skill will be ever taxed in every clime and amongst every race, to stay the destroying hand of this universal enemy of our kind. For in some one or other of its forms, this cosmopolitan disease meets you in both hemispheres, and on either side of the line. And if you wish to be worthy of your high mission, and equal to the responsibilities of your calling, you must be prepared, with all the resources of your art, to meet this deadly antagonist face to face, and to dispute with him each inch of ground, remembering that the contest is for that in which no earthly power nor the fullest riches of the earth can avail aught, if it be not given to your art under God to achieve the victory over death.

Perhaps in no position in life are the duties of a public servant of so high a character, of such immediate importance, and of such direct utility, as those of the medical officer, in either branch of the public service, naval or military, when he is entrusted with the care of the chosen troops of his country in time of war.

It is only for the vulgar and the uninformed that war exhibits its greatest terrors on the battle-field. The medical history of every great campaign that the world has seen, tells us that the most murderous inventions which military science has produced, from the remotest times to the present, reap but a small harvest of death when compared with the long black list of mortality which the rolls of disease furnish in such fatal abundance. And in this mortality, fever, as we have before said, has, in almost all campaigns, played the largest part. M. Scrive tells us that in the late Russian war 309,268 was the grand total of men of all arms sent from the shores of France to the East, of whom not less than 200,000 entered the *ambulances* or army hospitals; of these only 50,000 were entered for *wounds*, while 150,000 were admitted for diseases of one kind or another, mostly fevers and dysentery.

A complete and thorough education in the pathology and therapeutics of fever constitutes, in my mind, the first and most essential requirement of the medical officer in the public service.

How is this necessary requirement to be obtained? It is only by careful and diligent study in the clinical wards of an hospital, and the close following of the various phases of the disease at the bedside of fever cases, combined with the systematic teaching and guidance afforded by a Chair of Practice of Medicine, such as that I have the honour to fill, and from which this important subject will be developed to you in all its bearings. From a conviction of the paramount importance of the study of fever, it is my intention to devote a special, and by no means curtailed, part of my course to its full consideration.

And, gentlemen, let me impress it upon you, that if you lose the present opportunities which you enjoy as students of medicine in this country, where fever is always at hand to be studied at will, and in the fullest manner, it may never again be your fortune to have the opportunity of mastering its phenomena and the principles of its treatment, till you are suddenly called to assume the awful responsibility of dealing with it, when in some distant foreign station it springs into existence, with a force, a suddenness, and a malignity, that would strike terror in the boldest hearts and the most experienced heads. If you are not entirely heart-hardened and dishonest men, the conviction of your ignorance will then bring upon you a sense of culpability, if not of actual criminality, that will go far to paralyse your energies, if you be so unfortunate as not to be prepared with the previous knowledge and experience requisite to oppose successfully the hostile advances of this fell disease.

In one respect you will be peculiarly and unfortunately circumstanced, if you are called upon to deal with an outbreak of fever unfortified by a previously acquired and well-grounded experience of it. Your general professional knowledge will be of much less direct avail in this than in almost all other classes of diseases; for it cannot be denied that fever has a special pathology, and demands a special system of therapeutics, and for each of us these are to be learned solely by a practical and personal experience of the disease, and by that alone. It is far from my intention to under-rate the importance of the surgical part of your duties. But I believe that while with a competent knowledge of anatomy and the ordinary principles of surgery, the results of even one campaign will make an efficient operator of the diligent and observant staff and regimental assistant-surgeon, and prepare him for almost any emergency of the battle-field, nothing can supplement the want of an early and systematic training in the pathology and therapeutics of fever. I have myself guided the eager and nervous, though resolute hand, of a junior assistant-surgeon in his first operation in the field, and I have seen that same person, but a few months later, wield the knife with all the skill, the dexterity, and the firmness of a practised operator. On the other hand, I have known men to be bad practitioners in fever who were not deficient in ability or power of observation, who had passed through many campaigns, and who had had repeated opportunities of witnessing fever epidemics on a large scale, but who, from deficiency in original training and in the principles of the pathology and treatment of fever, continued, and I firmly believe were ever destined to continue, unsafe practitioners in this great class of diseases. Indeed, I believe that if the groundwork of this most essential study be not properly laid, before you pass into the turmoil and agitation of active professional life, no matter what your abilities, no matter what your subsequent acquirements, you will never deserve that amount of confidence which could be safely reposed in the diligent student of three years' standing, who had zealously pursued the study of fever as taught in this city.

I am confident that were the importance of these maxims fully known to, or duly appreciated by those who hold the direction of the public medical service in these kingdoms, steps would be taken to ensure, as a necessary qualification for entrance into this branch of the service, the certified attendance of every candidate on a full and complete course of instruction in the pathology and therapeutics of fever. I feel every confidence that some such course will be adopted sooner or later, and that the lives of so many gallant fellows shall not be trusted to the chance knowledge and haphazard acquirements of those who are charged with watching over their health.

Here let me observe, that I in no manner wish to cast aught of slight or imputation upon the able medical officers of the British army. Amongst them will be found numerous able observers, and skilful practitioners and profound pathologists. Amongst them I number a host of fellow-students and personal friends of riper years, for whose knowledge and acquirements I have the highest esteem. But what I do hold up to public animadversion is, that while fever constitutes, admittedly, the most formidable of the scourges, or the retributive visitations, if you will, to which armies as well as other masses of men are liable, it should be possible for any person, no matter what his other acquirements, to be placed in charge over bodies of troops, who shall not have given satisfactory evidence before his nomination to such a trust, that he has had special opportunities for studying fever, and that he possesses the requisite skill and knowledge to combat this disease when it breaks out amongst those entrusted to his care. Under the present system it is possible, it may be, and I believe it often is the case, that a person will be called on to treat fever on a large scale, who has never once set foot within the wards of an hospital in which fever patients are received. And this may, and for aught any one could show to the contrary, does occur, not only in garrison at home, but still worse, on distant foreign stations, where the advantages of professional assistance and consultation are not attainable. In this respect, and it cannot be too widely known, a great defect still exists in the medical educational arrangements of the public service.

We shall now proceed to inquire what fever is. The disease has been variously defined, but with no better success than is found to attend other attempts at systematic definition in medicine, as well as in many other branches of science. I can find no better definition than that furnished by Cullen, and slightly modified by Dr. Christison. It is, as you will see, rather a brief enumeration of the chief phenomena which attend the outset of a fever case, than a definition in any strict sense of the word. It is to the following effect: — "After a preliminary stage of languor, weakness, and defective appetite, — acceleration of the pulse, increased heat, great debility of the limbs, and disturbance of most of the functions, without primary local disease."

You have here a very good outline of the more ordinary characteristics of fever on its first invasion of the system, but you have withal learned but little that is of an absolutely positive nature; for, as we shall subsequently more fully see, there is but one of the phenomena here indicated which can be regarded as essential and constant.

If you ask me to name for you a character of Fever which will stand the test of being invariable, constant, and so far *essential* to the pyrexial state, the most advanced researches of the most modern school of pathological inquirers can add nothing to the doctrine propounded by Galen, so long since as the second century of our era. This great observer asserted that the *essence* of fever consisted in a *calor prœter naturam*, or an increase of the animal temperature of the system to a degree greater than that of the physiological standard. The metaphorical significance of the terms applied to the disease from a very early period in the Greek, Latin, and other languages (febris, from *fervere*, to glow; pyrexia, from πυρέσσω, I am hot), implies the almost universal recognition of the condition of increased temperature in fever. Now the researches of modern chemistry seem to show that these names are in reality less metaphorical than they would at first sight appear to be. While, furthermore, it is proved that the animal temperature, whether in the physiological state of health, or in the pathological state of disease, is maintained by a true process of combustion, in no essential respect differing from that which takes place in any ordinary fire, or other agency consuming oxygen and generating artificial heat.

It would form the subject of a digression full of interest, and not devoid of practical import, if I were to place before you a historical view of the various doctrines which have in succession held sway for a time in the world of medicine with regard to fever. I might glance at the specious doctrines of the Humoralists, the singular modifications which the humoral pathology underwent at the hands of the alchemists, and the half-mystic, half-philosophic dogmas of Stahl. These latter hold, as it were, a middle place between the vague speculative Medicine of the olden times, and the more exact observations of the inquirers of the seventeenth and eighteenth centuries, which so largely contributed to lay a solid basis for the more truly scientific and elaborate researches of recent times. I could likewise dwell, with no small advantage to you, from the example which they afford, on the admirable method, the profound research, and the scientific acumen evinced in the labours of Bonetus, Baglivi, and Boerhaave, or in those of Sydenham, Morgagni, or Valsalva. I would also gladly avail myself, did time and space permit, of this opportunity for dwelling upon those labours of the illustrious Cullen, which laid the foundation of the subsequent fame of the Edinburgh School of Medicine.

But, as I am not without hope, that ere long the important subject of the history of our art, so entirely neglected amongst us in this country hitherto, will be illustrated in special courses of Lectures, I leave for that more fitting occasion, and for an abler hand, I trust, this vast range of subjects, to which it would be impossible to do justice in this place, and which would only embarrass us if we attempted here any examination of them, however imperfect and superficial. Some very remarkable doctrines there are which belong to a school and a period but little anterior to our own, and which, till but recently, exercised a very extended influence on the views entertained throughout Europe with respect to the pathology of fever. I refer to the theory which emanated from the great French Anatomico-Pathological School, and which was supported by a body of investigators, who, for the ability, the profound research, and the enduring character of their inquiries, have seldom, if ever, been equalled in the history of our science. According to this theory, fever was regarded as the constitutional result, and its symptoms as the general expression throughout the system of the effects of a localised process of disease, having for its constant seat a part of the intestinal canal.

This view was based by its supporters upon a series of investigations, almost unparalleled for their extent, and for the completeness with which the pathological anatomy of the various lesions of fever were investigated. And thus, while the theory itself is fast passing into the domains of medical history, such was the profound ability and the masterly spirit of research which characterised this school of inquirers, that the facts which they accumulated will ever remain, not alone as a monument of their labours, but as a permanent and valuable acquisition to science.

On a future occasion we shall have to inquire more particularly into, and indeed borrow largely from, the labours of the illustrious Louis, and some of his colleagues, for the illustration of the pathology of one special form of fever, the typhoid.

The eminent investigators of this period, amongst whom Louis stands pre-eminent, constituted a school of observation and theory combined. It was succeeded by one, which centering chiefly in the labours of one man, Rokitansky, of Vienna, was confined almost exclusively to the accurate observation and record of facts in pathological anatomy. It is only in an advanced period of your studies, that you will be in a position to recognise the value of the vast additions which have been thus made to medicine by this great observer, almost single-handed. It may be said that he has given to our knowledge of disease an approach to certainty, that till his time could scarcely have been hoped for by even the most sanguine inquirers.

Before I pass from this very cursory notice of so important a period, I may express a hope that at some time not very remote, the labours of Schoenlein will be made known to you as they deserve. Many others there are likewise, whose names have not received their due meed of acknowledgment and praise in this country; and whose lives and labours, influential as they have been in the advancement of our art, and its collateral branches of science, fully deserved a warmer recognition at our hands.

In any notice of the general pathology of fever such as this, it will not be possible to pass over the investigations of a contemporary school, that of Virchow, of Berlin, and his colleagues, who represent the most advanced inquirers of modern medicine. Indeed, while we have up to the present moment but passingly glanced at some of the various theories which have been promulgated in respect to fever, I think it will be worth our while to enter with somewhat of closer detail into the views of Professor Virchow. For, though I am far from saying that they are to be considered as giving us a whole and complete solution of the pathological problem—what is fever? they may, I think, be safely accepted as embodying a large amount of what is most essential for the ultimate determination of this question. For my own part, I am fully persuaded that in following them up, we shall be on the right track. But be this as it may, they now occupy so prominent a place in scientific medicine, that I should not be doing justice to you or to my subject, if I did not place before you a brief but clear *exposé* of them.

Fever and inflammation, in some respects the analogues of each other, constitute the most remarkable of all the pathological processes which we are acquainted with. Though they undoubtedly present many opposite characters, there is, and indeed probably ever will be, a kind of debateable ground, in which it is extremely difficult, if not impossible, to assign strict limits to each. It would even seem that these processes may be alternate or intercurrent; or, on the other hand, their characters and phenomena may be so blended, that we can only adopt the expedient of a mixed term to define the resultant condition. This difficulty, if not impossibility, of drawing a marked line of demarcation between these great morbid processes, is practically exemplified in the retention in medical language of the still common and habitual expression—inflammatory fevers; in the use of which we recognise and acknowledge the difficulty of assigning to each of these great morbid states its distinct part. But, while the two states often unquestionably present so much of analogy, and while we admit that they may often co-exist simultaneously and concurrently; you must impress it upon your minds as one of the cardinal points of your compass, and one of the prime canons of your art as practical physicians, that FEVER IS NOT INFLAMMATION. At a further stage of our inquiry, we shall endeavour to draw such lines of demarcation for your guidance in this respect, as may be practicable in the present state of our knowledge.

We now proceed to address ourselves more particularly to the question, what fever is. Of the various phenomena presented by fevers, that of an elevation of the temperature of the body, in whole or in part, is the most constant and remarkable, and has likewise attracted most inquiry. With Galen, as we have before stated, the *calor præter naturam* constituted the essential phenomenon; many subsequent observers have, however, refused to recognise it as either constant or essential. And this is not to be wondered at, for a very striking and obvious diminution of temperature, in several parts of the body, not only attends the outset of fevers, when the patient's own sensations, and the impression upon our senses fully concur, as to the actual coldness of various parts, but is often present at a late period of the disease. We now refer to the phenomena of intercurrent rigors, which are often known to occur pending the course of febrile diseases, and sometimes even at their very height; algid states exemplify the same.

While the determination of this question rested on the fallible evidence of sensation, and such imperfect tests as that of the application of the hand, it was obviously impossible that it could receive any definite solution. There was clearly but one method by which positive results could be obtained, such as should be beyond the reach of cavil or question. Such means were furnished by the thermometer alone; and it is only to be wondered at, that this test was not earlier applied. An observer of the German school was the first to put in practice this definite mode of investigation. De Haen was, I believe, the first to employ the thermometer to ascertain the temperature of fever. His observations went to show the entire correctness of Galen's lemma, with regard to the *calor præter naturam.* For De Haen found that, *even in the rigors of fever*, there was in internal parts a manifest increase of temperature, in some cases to the extent of 2°, 3°, and even 4°; he further showed that the slightest febrile conditions are attended with an increase of heat, which is likewise in some instances the only observable phenomenon whatever. These experiments have been since repeated and abundantly confirmed by many inquirers. The fever temperature has been determined in the mouth and the anus, the axilla, the folds of the groin, and other parts. We have now the accumulated authority of such men as Gierse, Roger, Traube, Zimmerman, and Bärensprung, to name no others, for stating that elevation of temperature of the whole, or some parts of the body, of internal if not of external parts, is a constant and unfailing attendant on the febrile condition. So that Virchow seems to be fully justified in the statement, that it is no longer doubtful, that in the *calor præter naturam*, as stated by Galen, *is the substance of fevers.* What then, you will ask, is to be said respecting the chilliness, and even positive cold complained of by the patient on the invasion of febrile disease, and appreciable not only by the sensations of the patient, but also by the sense of touch of the physician? It is found that these sensations of cold, which accompany the rigors of the incipient febrile condition, are in reality but peripheral phenomena; for to use again the words of Virchow, *Während die ausseren Theile frieren, brennen die inneren,* "While the outer parts freeze, the inner burn." These are all-important, but simple observations, which you can readily verify for yourselves. Increase of temperature, then, to the extent it may be of 4° above the physiological standard, is to be regarded as a constant, and, so far at least, an essential condition of fever. And thus, while the natural blood heat in health may be assumed to be about 98°, when the condition of fever is established, the thermometer placed in the mouth, the anus, the axilla, or other suitable part, will be found to indicate an increase of the systemic temperature to 100°, 102°, 104°, or it may be even a little more.

Now can we point to any one other condition of which it may be said that it is constant in fever? I believe that we must answer this question in the negative; for what we know of the phenomena of nervous disturbance, however their importance may be ultimately established, is yet too indefinite to be relied upon, and therefore increase of temperature remains as the one sole *constant* element of the febrile state, of the existence of which we have well-established and reliable scientific evidence. Various other phenomena indeed are, doubtless, commonly attendant upon the fever condition; but it is undeniable that, with the exception of that here specified, any or all of them may be absent in particular cases.

If we inquire what is the seat of this increased temperature, we shall find that wherever it may originate, and however it may be induced, the whole blood-mass must sooner or later participate in it. What its precise point of departure may be, we have no means of determining. It would certainly seem to be general rather than local. But however this be, it is obvious that the blood in some parts at first, and in all finally, must share in the general increase of temperature. It is the only all-pervading element: and for this reason, *i.e.* that it is, so to speak, an ubiquitous fluid of the animal system, the blood, even though the change of temperature be not first and originally induced in its own mass, comes necessarily sooner or later to participate in it. In the fully developed condition of the febrile state, we may fairly assume that all parts and tissues of the system partake, more or less, of the increase of temperature, indirectly, and by communication of heat, if not directly and by actually contributing to its production. We shall presently see how far it is probable that local and general tissue changes, or histo-chemical metamorphoses of the constituent elements of the body conduce to this end. We shall not stop here to examine the various theories which from age to age have been put forward to explain the phenomena of increased temperature in fever. Certain physical conditions, such as increased velocity and friction of the blood-particles, cannot, perhaps, be altogether excluded from consideration. But in the present state of science, it must be admitted that the chief source of increased temperature in the febrile state is to be sought in an increased activity of the causes which operate in the production of the physiological or healthy temperature. It is now placed beyond question, that the source of the normal animal temperature is to be found in the chemical development of heat attendant on nutrient changes perpetually going on in the tissues. There is no reason for seeking other sources for the fever heat than those which are known to furnish the natural heat; they are, in the very first place, enough and sufficient, and beyond this it is unnecessary to go. Virchow assumes them to be augmented in fever, or in other words, he assumes that the nutrient metamorphosis of the tissues is increased, and, as a natural and necessary consequence, this gives rise to increase of temperature. There is an increased consumption of organic material throughout the system; but this is not the only departure from the normal action in fever, for it is not alone the materials supplied by nutrition that are subjected to increased metamorphosis, *i.e.* increased combustion, which implies increased temperature; but the actual constituent elements of the body themselves undergo metamorphic changes, and are removed, and this in some instances to a very remarkable extent. Not only the animal fluids, such as blood, parenchymatous fluids, the animal oils and fats, but even the solids, as muscle, gland-tissue, and bone itself, undergo manifest diminution in volume and density in the course of febrile diseases, often to an excessive degree.

Increased respiratory action has likewise been assigned as a cause of increased consumption of organic material, and of the increase of temperature, the exhaled carbonic acid thrown off from the lungs being taken as the standard of measurement in estimating the increased activity of the respiratory combustion powers; and some exact observations which have been made do appear to show that, as far as this function is concerned, there is an actual increase in the process of oxidation in fever. This, however, is undoubtedly but an imperfect mode of estimating the amount of oxidation, for, as recent researches show, many organic substances become oxidised without the production of carbonic acid; on the other hand, Moleschott has remarked that the origin of heat in the body is not to be attributed solely to the combinations of oxygen with organic materials, but that in the separation of bodies which become only in part oxidised is to be found a rich source for the production of animal heat. This statement is meant to apply to the physiological condition, but it is obvious that it is equally applicable to the pathological.

However induced, increased rate and force of the circulation are commonly observable at an early period of fever; increased circulation almost necessarily implies increased nutritive changes in the tissues generally, the consequences of which have been seen to be increase of temperature. We know likewise from the experiments of Becquerel and Breschet, and those of Helmholtz, that even artificially induced muscular movement is attended by increase of temperature, while it is proved from other sources of observation that muscular movement is attended by consumption of muscular tissue. Other observations are not wanted to show how increase of the natural processes of nutrient metamorphosis is attended with increase of temperature. We may, therefore, I think, safely assume that increase of temperature in fever is the result of increased tissue change, which is itself immediately connected with, if not entirely dependent on, increased circulation, whether local or general. But in a subsequent Chapter we shall have occasion to prove that this assumption is not gratuitous, for it rests on the basis of observed facts.

If, then, with Virchow, we regard increased heat as the pathognomonic symptom and the essential condition of fever, and consider it to be dependent on increased metamorphosis and increased consumption of the constituents of the body, we have yet to seek the cause of this increased action in the system. This cause, the *causa proxima*, of fever, Virchow regards as internal, and connected with the body itself, in contradistinction to the external cause acting on the body from without. Various changes in the constitution of the blood, productive of a *materies acris*, fever-stuff, the *pyretogen* of Eisenmann, have been assumed as the causes of fever; but while we may hold that in many cases some such change is actually produced, we are not yet in a position either to determine its precise nature, or to understand how it is itself brought about.

Some facts determined by recent investigation and experiment would appear to show that the first steps in the establishment of febrile conditions are not to be sought in the blood itself, or any part of the circulating apparatus; and to indicate certain deranged conditions of the nervous system, as more likely to furnish us with an explanation at once rational and probable on this point.

CHAP. II.

GENERAL PATHOLOGY OF FEVER.

You must permit me to recall to your minds, in a brief recapitulation, the most essential of the facts which we considered in our first Chapter in connection with fever.

After a very cursory glance at some few of the more important of the various doctrines which have been held from time to time regarding fever, we were engaged in the more immediate and detailed consideration of those remarkable views recently propounded by the school of Virchow.

We saw that in the opinion of these eminent authorities, fever was essentially characterised by the condition of increased temperature, which was to be regarded as the result of an increased consumption of organic material throughout the system. We saw that, even in the stages of rigors, the increase of temperature was found in some instances to reach 2°, 3°, or more degrees, above the physiological standard; and that thus, while the normal blood heat was about 98°, the temperature of fever might be regarded as from 100° to 102°, or 104°, or even still more in some cases.

Having shown how fever heat, increased rate and force of the circulation, and increased consumption of organic material, thus stood in close connection, we were next about to inquire how far the state of science at present warranted us in assuming that any special point of departure could be assigned for the various phenomena comprised under the head of fever.

It was maintained by Cullen, in the last century, that the first link in the chain of fever actions, was a depressed state of the brain and nervous system. He considered that the spasm of the capillaries, the favourite theory of Hoffmann, resulted from this depression of the brain and nervous centres, and that the reaction of the circulation was an effort to overcome this state of spasm of the extreme vessels.

I believe there can be now but little doubt that the former part of this proposition of Cullen has anticipated to some extent what we must now admit to be an effective cause in the production of the earlier febrile conditions. We cannot appeal to the blood itself, or to any one part of the circulating apparatus, more than to another, for an explanation of the phenomena which are exhibited in fever. Increase of heat is doubtless caused by increase of metamorphosis of the tissues, and this in its turn we know to be dependent on increased circulation; but we have still to inquire what it is that causes this increase of circulation, either as to rate, force, tension, or other of its physical conditions.

Knowing, as we do, from the results of various independent observations and experiments, that the circulation is directly under the control of the nervous system, we shall add one more link to the chain of evidences we possess respecting fever, if we are enabled to show that increased temperature, as resulting from increased circulation in fever, is in any directly assignable way under the influence of nervous power.

Without very ample digression, it would not be possible to go at length into the accumulated evidence which can be brought to bear, from experiment and observation, upon the relations existing between certain states of the nervous system, as to either excitation or depression of its functions, and certain phenomena of the circulation and of animal temperature, which stand in direct relation to each other. We must content ourselves with briefly citing what seems best established in this department of physiological physics, and most pertinent to the matter in hand.

It seems pretty well determined that certain parts of the nervous system preside over the general and local circulations, and through the circulating apparatus over the general and local processes of nutrition, and of nutrient metamorphosis of the tissues. It is this latter change we know which immediately influences the development of animal temperature; and thus animal heat, through the medium of the tissue metamorphosis, by which it is directly generated, comes to be, in one remove only, under the control of the nervous system. The nerves, in fact, it may be stated, from their influence over the circulating apparatus, constitute the natural regulators of the development of animal temperature.

As stated on a former occasion, when we were engaged in a more detailed consideration of this subject (*British and Foreign Review*, 1855), there is no reason for seeking other sources for the fever heat than those which furnish the natural heat: only it may be considered that in fever the usual processes are in excess, and this excess may be traced to either of two sources. We may suppose that certain nerves preside over the development of heat, or that its production is moderated by certain nerves; in the former case, the febrile heat is to be attributed to an increased, in the latter to a diminished, innervation. The experiments of Becquerel and Breschet, and those of Helmholtz show, as already stated, that nervous excitation, when it induces muscular contraction, is attended by increase of temperature. In opposition to this, Bernard has proved that section of the sympathetic nerve in the neck is followed by rapid increase of temperature in the corresponding half of the head. Brown-Sequard's experiments are to the same effect. E. H. Weber has shown that irritation of the vagi nerves causes an arrest of the heart's action; while it is long known that after section of these nerves, a remarkable acceleration of the pulse takes place. Ludwig and Hoffa have ascertained that, by moderate irritation of the vagi, the lateral pressure of the blood in the arteries is lessened; while Volkman and Fowelin have established that it is increased after section of these nerves. A very interesting therapeutic experiment of Traube bears immediately upon this subject, and confirms the results of Weber above stated. He has found that digitalis acts as an irritating stimulant upon the regulator nerves of the heart, and that a diminished temperature is produced by its employment, which he attributes to the diminished velocity of the blood-stream. The causes which regulate the velocity, tension, and other physical conditions of the blood-stream, and the vessels which convey it, seem unquestionably to reside in the nervous system, which exercises a sort of regulator or moderator function over the circulation, and through the circulation over the animal temperature.

Now, taking into account the various phenomena which attend the onset of a fever, characterised as it is by weakness, prostration, and loss of energy, especially in the muscles and sensitive apparatus (and all, as you must bear in mind, so rapidly induced, within a few hours in many cases), we may conclude with Virchow, that the elevation of temperature, which is found to be amongst the earliest as well as most constant of the symptoms, is a paralytic phenomenon. Though not identical with the ordinary paralytic state, it is in all essential respects analogous to it, and can only be produced by a loss of power in the nerves which constitute the natural regulators, or it may be moderators, of the development of animal heat.

With regard to this moderator function, but little of a positive kind is yet determined, and it seems to be indifferently assignable to various parts of the nervous system.

The question of the *tone* of the vessels, and its alterations in fever, has been often the subject of consideration with physiological pathologists, and a large part has been assigned to the so-called vasi-motor nerves in the production of such changes. In regard to the phenomena under consideration, the cerebro-spinal, and the sympathetic nerves, and with these latter I think we may say the vagi, appear to present somewhat different properties; thus, in paralysis of the former, *i.e.* the cerebro-spinal nerves, there is always a greater or less diminution of temperature in the parts which they supply; while, as regards the

the latter group, *i.e.* the sympathetic and the vagi, they retain their power even in cases of complete paralysis of the cerebro-spinal system, and this power may be increased when the branches connecting them with the spinal marrow are paralysed, and this may likewise be accompanied with an increase of temperature.

There seems to be great reason for selecting the vagus as one of the most important agents concerned in the production of the chief febrile phenomena. Besides the elevation of temperature, the alterations in the general circulation, and the movements of the heart, the lesions of the digestive functions, anorexia, vomiting, &c. &c., as well remarked by Virchow, fall within the domain of the physiological influence of the vagus. The lesions of the heart, the lungs, and the stomach, fall thus into one category; and, as suggested by Traube, these, as well as a large number of the other symptoms of fever, may be referred to a weakened, *i.e.* a more or less paralytic condition of the vagus.

I may here mention, in connection with the experiments just detailed, and upon which these views are based, that observations made by Lichtenfels and Frölich appear to show that in the normal condition the frequency of the pulse and the temperature are independent of each other. What Lichtenfels and Frölich have shown respecting the want of correspondence between the pulse-rate and temperature, in the physiological state, my observations establish for the fever condition. The following combinations of pulse-rate and temperature were recorded by me in certain cases of yellow fever in the Lisbon epidemic of 1857; they supply a desideratum.

						Fahr.
1.	In case with	pulse at	113	per minute, the thermometer in axilla gave a	temperature of .	102°
2.	„	„	100	„	„	100°
3.	„	„	112	„	„	104°
4.	„	„	104	„	„	103°
5.	„	„	92	„	„	101°
6.	„	„	100	„	„	103½°
7.	„	„	104	„	„	103°
8.	„	„	100	„	„	104½°
9.	„	„	84	„	„	99°
10.	„	„	70	„	„	100½°

From this table it will be seen that the highest pulse-rate and the highest temperature did not correspond. On the contrary, the highest pulse at 113 had only a moderate elevation of the thermometer, 102°, while the pulse at 100 gave the highest temperature, 6½° above the physiological standard, and a temperature of 100½° (with noticeable *calor mordax*) attended a pulse at the normal rate. There was, therefore, no uniformity of relation between the two sets of phenomena; and this we believe to be not at all uncommon.

These results may, at first sight, appear contradictory to the views we have accepted; but on closer inquiry you will find that it is not so. The *frequency* of the pulse under many conditions, and more especially in fever, is a most inadequate and unreliable test of the most essential states of the circulation. Even the heart's contractions will be often found to be an imperfect criterion of the state of the circulation; great rapidity of its beats may often be ascertained to be attended by an incompleteness and weakness of its ventricular contractions. Indeed, so imperfect are these contractions sometimes found to be, that the mass of the blood, instead of moving with increased velocity, is retarded, and flows more slowly than usual. The same is to be said of arterial contractions which, when most frequent, are often, as we know, attended by a most imperfect circulation of the blood-mass. As temperature is entirely dependent, not so much on the rapidity as the efficiency of the circulation, we should be prepared for, and indeed expect, that mere frequency of pulse is no measure of temperature, or *vice versâ.* You must therefore bear carefully in mind, that the state of the circulation, whether physiological or pathological, is to be estimated, not so much by the *apparent* energy and the number of the heart's contractions, or those of the arteries, which taken singly are very fallacious guides, as by the general tension of the whole vascular system. In practice you must carefully examine and weigh every physical and vital condition of both heart and arteries. The force of the heart's shock, as well as its extent, and the completeness of the ventricular systole, must be carefully determined by the hand and by the stethoscope; at the same time your observation is to be corrected by careful examination of the arterial pulse at various points, at least in the carotids, the radials, the abdominal aorta, and the femoral arteries. These examinations may seem tedious, but they can be both rapidly and carefully made by the quick skilful touch of the practised physician.

Fever, then, in the opinion of Virchow, essentially consists in an increase of temperature, which is caused by an increased consumption of organic material in the system, and appears to have its origin in certain changes in the nervous system. These changes may be considered to affect primarily the regulator or moderator-functions of the nerves, and to be of a paralytic nature. It is probable that the vagi nerves, and we would add the sympathetic, are primarily if not chiefly engaged in the production of the febrile phenomena.

If we seek for the determination of any centre for the regulator-functions of the nerves, and especially of the vagi, it will, in the opinion of Virchow, be most probably found to reside in the medulla oblongata, near the roots of the vagi.

Virchow believes that every given disease and every lesion may pass into a fever, if it invades the regulating centres of the consumption of nutrient material. As these centres are to be sought only in the nervous system, an abnormal state of tension or irritation of them must be admitted, which is called into play by the causes exciting the fever, and which finds no solution in the natural processes. As the power of the moderating centres is arrested by the abnormal tension or irritation, the consumption of material advances throughout the tissues, and in proportion the heat of the body increases, and the particular point of the commencement of fever is reached. At first we see only the weakening of the corporeal and mental powers which follows directly on the condition of tension or irritation being induced, and this in some instances with such a force and suddenness of the prostration of the vital powers as to suggest the idea of a true paralytic invasion of the nervous system.

What has been hitherto but surmise upon this subject is now, as we have seen, reduced to the domain of probable fact. And it is at least possible that the fever-poison first invades the animal system through the channel of the nerves. In your practical experience of the disease you will not infrequently meet with persons, and their evidence on the subject is very credible, who will tell you that they distinctly felt the first impression of the fever-poison, or, as we term it, *the fever-shock*. I have myself a distinct remembrance of the circumstance in my own case, when I "took the fever," some years since, from a particular case of the worst form of maculated typhus in the Meath Hospital. When scientific research and common experience coincide, as in this instance, you may feel pretty well assured that scientific inquiry is fairly upon the path of truth. For myself, I believe that in the line of investigation now being pursued we are on the right road to a whole and satisfactory theory of fever; we are, however, some way from this desirable end as yet.

Such is a brief outline of the views which now appear most tenable with regard to the nature of fever; much is yet left undefined, and there is also much which will present itself to the mind of every practical physician as difficult to be brought within these limits. To those especially who have pursued close and accurate clinical studies of typhus fever, many points in its pathology will doubtless appear to be, as yet, at all events, incapable of solution by the theories of Virchow and his colleagues of the Berlin school.

We shall here pause for a brief space in our more immediate inquiries with respect to fever, in order to bring forcibly into contrast for you some of the more recent results of research with respect to inflammation.

Inflammation constitutes in some respects the analogue, in others the opposite of fever: next to fever it must be considered as the most remarkable of all pathological processes. Virchow describes it as one of the general forms of compound phenomena, under which most different local diseases may manifest themselves. As in fever, the most remarkable phenomenon of inflammation is an elevation of temperature. In the former disease we found this to be general, while in the latter it is only local; and this character, viz. localisation, may be persistent throughout the whole course of a given inflammatory process. This cannot be the case in fever.

We shall omit here all notice of the various doctrines held from time to time as to the essential characters of inflammation, from the symptomatic quatrain of Celsus (the *tumor et rubor*, *cum calore et dolore*), to the fluxus, stasis, constriction of the capillaries, obstruction and stasis of the blood-stream and the *error loci* of the globules. These subjects are discussed at length for you by able surgical writers. Suffice it to say, that two most opposite conditions of the blood-vessels, spasmodic action and paralysis of their walls, have been assigned as causes for some of the most essential phenomena of inflammation, and each has received the support of distinguished investigators. It is now, however, pretty generally agreed upon, at all sides, that the local alterations of the circulation, in themselves neither simple nor uniform, are insufficient to define inflammation ; it is said that not any one of the many phenomena assumed by various observers to be essential, is constant, and that even opposite states of the blood and blood-vessels may present themselves in succession within a short period in the same inflamed spot. It is even asserted, as by H. Weber, that the state of the vascular walls, whether it be one of paralysis or of spasmodic action, is of but secondary importance in reference to the stasis of the blood-stream. The theory which seems to invite most attention at present is that known as the attractive theory, which is based on certain physical relations found to exist between the blood, the vascular walls, and the parenchyma. In estimating this attractive force, several conditions come into play, as, for instance, the viscosity and cohesion of particles in the circulating fluid itself, and the molecular attraction between them and the walls of the vessels. Virchow accepts the attractive theory as capable of explaining the stasis, but not necessarily therefore the inflammation. The phenomena of stasis of the blood-stream, as observed in the web of the frog's foot under the microscope, have been so often described, that we need not here dwell on such details, as for instance, the diminished velocity, partial intermission and oscillation of the blood-column, gradual disappearance of the intercellular fluid, the lessening of the diameter of the blood-corpuscles, and their increase in number till they fill the entire vessel, and the whole mass stands still. As to the part which the surrounding tissues bear in the process, it is chiefly as to the *exudation* that we have to speak. Virchow regards the exudation in no other light than as the nutritive fluid,—blastema, or liquor sanguinis, of other writers,—which has passed from the blood into the substance of the tissues, and which cannot be separated from them or isolated. It has entered into their cells and become a constituent element of their nuclei and granules, and can hardly be regarded as distinct from them. Exudation is not to be considered, then as a product proper to inflammation, it is only a concomitant phenomenon, though often largely in excess of the physiological limits; the *products* of inflammation are, as it were, like those of a process of destructive distillation, and are represented by the disintegrated tissue-elements which become, so to speak, excrementitious, and must be thrown off. The inflammatory process is to be regarded as a local lesion of nutrition, and as such it depends for some of its most essential phenomena upon the interchange of materials between the blood and the tissues.

Elevation of temperature has been long known as a marked characteristic of the inflammatory process: it constituted, as we know, one of the four cardinal phenomena insisted on by Celsus. Experiment and observation give somewhat conflicting results as to the exact conditions of temperature in inflamed parts; the weight of argument is, however, on the side of an absolute increase. Increase of temperature in inflamed parts was ascertained by John Hunter, and more recently by the thermo-electric method in the hands of Becquerel and Breschet. Virchow considers it as highly probable that increased heat is produced in inflamed parts, but that the temperature of the foci of inflammation is to be regarded as the expression of two distinct sources of heat, one of which is to be sought in the blood, and the other in the parts themselves. The local elevation of temperature produced by the increased influx of blood, always determined in excess towards inflamed parts, must contribute in some measure to the increase of the local metamorphosis of tissue.

The intermediate state, known as irritation, deserves some notice here. It is one in which there is a departure from health, but yet inflammation is

Fever has its origin in conditions over which we have no control under almost any circumstances whatever, and which are at best but little explicable.

Inflammation very commonly takes its rise from the effects of mechanical, chemical, or other irritants upon the animal structures; and true and complete processes of inflammation can be called into play, in any organ or tissue, almost at the will of the experimental pathologist, by the application of various mechanical, chemical, or other stimulants. Lastly,—and this is perhaps the most important point of difference, especially to the practical physician, as you will subsequently more fully understand,—inflammations are, to a very large extent, at all events, directly under the control of therapeutic agents; so far, at least, that inflammatory processes can be often, if not arrested, checked, modified, or so influenced that their destructive tendencies can be limited. As regards the true fevers, I am, for myself, persuaded that any attempts at arresting them, or altering their course by any system of therapeutics, by the exhibition of purgatives, emetics, diaphoretics, or other means presumed to be capable of causing the fever to abort, as it were, or to bring about a premature crisis, are so much worse than useless, that they often produce positively mischievous, if not fatal results.

Thus, while I believe it may be said with truth that we can *cure* many inflammations by the intervention of our art, the same cannot be affirmed of fevers. In fevers, the highest efforts of our art, the most delicate care, the most refined skill, the most nice appreciation and adaptation of means to ends which we can command, must be all directed to watching, supporting, maintaining, and it may be stimulating the system till the fever-storm shall have passed over it. In fever cases your duties, as practical physicians, will be like those of the sailor whose ship is riding out the gale. With firm hand and ready eye he is prepared for every emergency that can arise; but he neither puts on sail nor club-hauls his ship till the actual moment of danger arises. It must be the same with the physician in the management of a fever case; he must act on the *de*fensive, not on the *of*fensive. Press your ship too much, and she founders; meddle but never so little too much with the fever, and your patient dies.

CHAP. III.

CLASSIFICATION OF FEVERS.

I AM far from regarding our knowledge of the aitiology and general pathology of fevers as sufficiently advanced to enable us to classify the various forms of these diseases which are met with in practice on any truly scientific basis. But I consider the following arrangement to be free from grave practical objections, and it is at once simple, comprehensive, and readily committed to memory.

We shall regard all fevers as reducible to three great types, viz. —

I. PRIMARY FEVERS.
II. IRRITATIVE FEVERS.
III. ERUPTIVE FEVERS.

The first of these groups may be again subdivided as follows: —

PRIMARY fevers comprise *Continued*, *Intermittent*, and *Remittent* fevers; and each of these classes is again made to embrace subdivisions which will be more readily comprehended in their mutual relations by an inspection of the following scheme, exhibiting at one view a classified arrangement of the several kinds of fevers recognised by the best writers.

I. PRIMARY FEVERS.

(*a.*) Continued Fevers :—

- *Synocha,* or Inflammatory Fever.
- *Synochus,* or Mixed or Nervous Fever.
- *Typhus,* or Adynamic Fever—Spotted or Irish Fever—Putrid Fever.
- *Typhoid,* or Enteric Fever.

(*b.*) Intermittent Fever, or Ague :—

- *Quotidian.*
- *Tertian.*
- *Quartan.*

(*c.*) Remittent Fever :—

- *Paludal Fever,* comprising Marsh Remittent, Bilious Remittent, and Yellow Fever.

II. IRRITATIVE FEVERS.

- *Gastric Fever.*
- *Gastro-Intestinal Remittent.*
- *Hectic Fever.*

III. ERUPTIVE FEVERS.

- *Variola*— Small-pox.
- *Rubeola*— Measles.
- *Scarlatina*— Scarlatina.
- *Miliaria,* Miliary or Sweating Fever.

GENERAL CHARACTERS OF THE THREE GREAT GROUPS OF THE PRIMARY, THE IRRITATIVE, AND THE ERUPTIVE FEVERS.

The primary fevers are essentially characterised by the development of a general pyrexial state, independent of specific pathological lesion, and having no necessary connection with localised disease in any portion of the body, or in any organ or tissue. All organs, and perhaps all tissues, participate in the febrile action when once it is established; but it cannot be said to originate in any one part more than in another, saving so far as the considerations already adduced, show that the first link in the chain of morbid actions may be found to implicate the nervous system. These considerations, it is to be observed, apply with equal force in all classes of fevers.

An apparent exception to the above rule offers itself in the case of the typhoid or enteric fevers, which so constantly present the associated condition of disease of the minute glandular apparatus of the intestines. But even here the relation of the enteric lesion to the fever is certainly not that of cause and effect; nor, again, is the connection proved to be one of an absolutely constant kind. In all the other forms of primary fevers, of what kind soever, it is beyond question that death may ensue as the result of the influence of the pyrexial action on the system, and yet it shall be impossible for the most minute pathological research to define the part or organ which more than another is the seat of cognisable lesion. Indeed, as is well known, primary fever may be fatal without a single organ in the body presenting recognisable physical change of any kind.

The Irritative fevers, on the other hand, owe their existence to lesion of a well-defined kind in particular parts of the system. They have a true anatomical seat or origin, and are to be regarded as the constitutional expression of localised disease. A gastric or a hectic fever has, in fact, the same relation to the localised pathological process which causes it, as the pyrexial or febrile state attendant on ordinary local inflammation, whether of the viscera or external parts, bears to the physical disease which lights it up in the system.

While, therefore, the Primary fevers are independent of all localised diseased processes, and are commonly to be met with unattended by pathological changes of any kind, the Irritative fevers recognise no existence independent of local disease of some kind. They arise directly from, and are, as already stated, the constitutional exponent of specific disease in certain parts or organs. Thus, gastric fever and gastro-intestinal remittent originate in certain states of irritation or subacute inflammation of the mucous surfaces of the stomach and intestines. Hectic fever, in a similar manner, is the exponent of tubercular disease in certain stages, or, under the name of pyogenic fever, of that state in which pus is absorbed into the system. It seems to me more than doubtful whether the so-called irritative fevers should continue to hold a place in the category of true fevers. Not only is their origin, as just stated, different from that of the primary fevers, and also from that of the eruptive fevers, but in many important particulars of their natural history broad lines of distinction separate them from the essential fevers. Their clinical history will be found to be not that of fever states, but of the local diseases with which they are associated. Unlike either the primary or the eruptive fevers, they are not known to be either endemic or epidemic; they do not seem to affect particular localities, and we are without precedent that they have ever simultaneously invaded masses of men.

The Eruptive fevers are characterised by the absence of all specific lesion of the more important viscera; while the cutaneous surface is so frequently the seat of pathological processes in these fevers, that in the majority of instances our diagnosis between the individual fevers of this group depends on the special character of the rash or eruption presented on the skin. It is true that we hear of a scarlatina, a rubeola, or a variola, "sine eruptione," but it is only an exemplification of the old canon, that the exception proves the rule. The pathology of these fevers is further complicated by the remarkable tendency,—well evidenced at least in two of them, measles and scarlatina, — to the secondary engagement of a more or less limited portion of the mucous surface. Scarlatina, as is well known, is commonly attended with a peculiar and characteristic form of sore throat; while measles is usually accompanied by a watery exudation from the eyes and nose (coryza), and a bronchitic affection varying in extent and importance. Small-pox offers an example of liability to lesion of the serous surfaces (pleuræ especially), and occasionally of the mucous coats of the intestines (pustules on intestinal mucous surface), but with far less considerable regularity than is observed in respect to the secondary lesions attending measles and scarlatina.

Like the primary fevers, the eruptive fevers frequently occur as wide-spread and fatal epidemics. In one essential particular they are imitated by only the typhus and the typhoid amongst the primary fevers, viz. that an attack of any of these fevers gives a certain protective immunity against its recurrence in the same individual.

One of the eruptive fevers offers the most singular instance we are acquainted with in the whole domain of medicine, of one diseased process being excluded by another. I allude of course to the protective influence of the vaccine virus derived from the cow, which produces such effects in the human subject as to materially lessen the natural liability to the invasion of small-pox, and in the great majority of cases to greatly modify the course and results of the disease when it does occur in an individual protected by vaccination.

Lastly, all the *true* fevers differ from the febrile or pyrexial states attendant on local or general inflammations, in the periodicity and more or less stereotyped character of their principal phenomena; in their running a more or less well-defined course; in their faculty of producing such lasting effects on the human constitution, that at least the more important of them seldom occur twice in the same individual; and, lastly, in their power of epidemic invasion.

CONTINUED FEVERS.

General Notions.

We have seen that the Primary fevers admit of subdivision into the Continued, the Intermittent, and the Remittent. Broad and well-marked characteristics distinguish these forms of disease from each other, and no doubt can exist that they constitute groups of diseased action perfectly true to nature. In this part of our subject we find, so far, an example of strictly truthful and natural classification in disease.

In the continued fevers the pyrexial state, though subject to exacerbations, which may be either periodic or irregular, will be found to be a continuous action throughout, from the first invasion of the disease to its termination. The tension (or depression) of the nervous system, the rate and other conditions of excitement of the vascular system, and the activity of the general tissue-metamorphosis throughout the body, and consequently the animal temperature, are all maintained at a standard above the level of health. They are, so to speak, kept *above par* continuously; and the human machine is, as it were, working at a high pressure, with an unremitting strain on its various parts. The whole series of actions involved may be gone through in a day (perhaps in less), or may be continued for two, three, four, five, seven, ten, twenty, or thirty days, and in some cases even still longer. But sooner or later a period arrives at which the febrile action is finally brought to a close, in some one or other of several ways, to be subsequently considered; and here the pathological processes finally terminate, not to be renewed again, except in the instance of the relapsing fever, and certain exceptional cases of pyrexial action, reinduced as the result of secondary processes of disease.

INTERMITTENT FEVERS.

General Notions.

In the intermittent fevers the series of actions which constitute the fever go through their course with singular regularity within an excessively short space of time,—a day, half a day, or less. They are brought to a final conclusion within this period, and it is as if the whole train of phenomena, which in an ordinary fever occupies from seven to twenty-one days, was compressed into a few hours; and then, without the exhaustive results consequent on a protracted period of disease, the patient is restored to his normal state, or at least to one of comparatively perfect health. Subsequent, then, to the pyrexial action a period ensues in intermittent fever, in which the state of the patient is perhaps that of perfect health and strength, and in which, as it often happens, he is able to pursue his ordinary avocations, bodily as well as mental. This is followed on the next day, the next day but one, or at a still longer interval, on the fourth day inclusive from the first attack, by a renewal of the pyrexial phenomena, in the same order, with very much of the identical characters which they manifested at first, and with a singular regularity as to the hours of the day, the duration, and other elements of time which marked the primary attack. An apyrexial period again ensues as before; and now, with a periodicity of most singular regularity in time and circumstance, the patient becomes the conscious victim on certain days of febrile attacks of well-defined character and duration. This train of actions may continue for a very protracted period, so, in fact, in some instances, as to be extended over many months. A pyrexial state with characters such as those just delineated, is designated an intermittent fever.

This class of diseases is remarkably influenced, if not in the vast majority of instances directly and exclusively originated, by conditions of climate, soil, temperature, moisture, and atmospheric impurities. The intermittent fevers are often of very persistent character, often difficult of eradication from the system, and in some instances they adhere through life to individuals who have been long exposed at some period or other to the combined climatic, meteorological, or terrene conditions capable of primarily inducing the disease. Amongst the secondary lesions induced by intermittent fever is that of an enlarged condition of the spleen. A singular controlling influence, which to a considerable extent may be strictly regarded as a curative power, is exercised over the fevers of this type by the active therapeutic principle contained in the bark of a large family of tropical plants, the Cinchonaceæ. The Jesuit fathers have the credit of first introducing into Europe the knowledge of the therapeutic effects of the various species of cinchona bark. Their order has thus conferred a lasting benefit on humanity.

REMITTENT FEVERS.

General Notions.

The Remittent fevers are distinguished by a more or less complete relaxation of the pyrexial tension of the system, without at any time such a total suspension of the fever phenomena as occurs in the intermittent fevers. Remittent fever is usually a disease of daily exacerbations and paroxysmal accessions, with subsequent diminution of the pulse-rate, temperature, nervous tension, tissue-metamorphosis, and such other pathological phenomena as make up the fever, of whatever special kind it may be. There seems, however, to be no strictly defined periodicity in the recurrence of the exacerbation and relaxation of these diseased processes. The fever paroxysm may remain at its full height for twelve, twenty-four, thirty-six, or forty-eight hours, and Hunter relates a case in which no remission was observable for seventy-two hours. In other instances there is observable in the fever not so much a tendency to the occurrence of exacerbations and remissions, marked by the hour or the day, as a natural division of the fever into two or more periods or stages, of irregular duration, and between which occurs an interval in which the patient appears to be convalescing, though there is not in reality any approach to the restoration of the physiological equilibrium.

Remittent fevers, of almost all kinds, likewise present a well-defined tendency to implication of certain viscera. The stomach, duodenum, and liver, and, in a secondary manner, the cerebral organs, are constantly engaged in almost all forms of remittent. Violent headache, with a distressing sense of tension across the forehead, rachialgia, or pain in the back, gastric irritation, with or without bilious vomiting, and not infrequently yellow coloration of the conjunctivæ, and general cutaneous surface, are phenomena of very frequent occurrence. Exudations of blood from the mucous surfaces occasionally give rise to the ejection of blood from the mouth and anus, constituting in the former instance the well-known and justly dreaded symptoms of "black vomit."

In still more aggravated forms of remittent, a general hæmorrhagic lesion is induced, partly dependent, no doubt, on chemical changes of ill-defined nature in the circulating fluid itself.

The nosology of remittent fevers is still in a condition the most ill-defined and unsystematic. The geographical divisions of the disease are as unscientific as those which are made dependent on changes of season and climate. Thus we hear of summer and autumnal remittents, East and West Indian remittents, Walcheren fever, Bulam fever, hill and jungle fever, fevers of Sierra Leone, Fernando Po, Bight of Benin, African, Bengal, lake and marsh fevers, &c. &c.

With most writers, yellow fever still occupies a position in the nosological scale of the most equivocal kind. As there is no ground for regarding it as a disease, *sui generis*, we shall place it under the head of remittent fever.

CHAP. IV.

SIMPLE CONTINUED FEVERS.

We apply this term to a form of pyrexial action of variable intensity and duration, unattended by specific cutaneous eruptions of any kind, and presenting no constant lesion of internal parts. At a variable interval, after exposure to extremes of heat or cold, the direct action of the sun's rays, over-exertion and fatigue, excess in food or drink, peculiar states of the atmosphere, change of locality or climate, certain depressing moral influences, and various causes of an ill-defined character, the system of persons previously in health begins to manifest the results of the morbid influences impressed upon it.

A sense of languor, debility, incapacity for bodily exercise, with or without tremors in the limbs, disinclination or actual incapacity for mental exertion, and sometimes a confusion of ideas, with partial, momentary, or continuous loss of memory, or other mental faculty, with or without headache or drowsiness, impairment of vision, or of some other of the special senses, are the chief symptoms complained of.

The patient feels an "all-overishness," says he "does not know what is coming over him," and the state known as *malaise* is established. This condition may remain for days, a week, or even more ; it may be regarded as the period of incubation of the disease ; loss of appetite, with more or less of gastric derangement, are often observable, but I have known a patient to eat his meals as usual during the whole of the period of *malaise.* The duration of this period is variable ; it may be but a few hours, it may even not be perceived by the patient, and the fever may, doubtless, set in with a more rapid and well-marked invasion. When the condition of *malaise* has lasted for some time, a more distinct set of symptoms is ushered in. Headache, pains in the back, loins, limbs, a sense of being beaten or bruised, and a feeling of universal soreness and excessive weariness in all the bones and joints, are now the most prominent features of the case. Chilliness, rigors or shiverings, or sense of cold water pouring down the back, a general shrunken and shrivelled state of the integuments, especially in the fingers and toes, absolute coldness of the surface in various parts, more particularly in the extremities, which are often livid or blue, constitute a part of the true fever state, which may be conveniently called the algid stage.

The cold complained of by the patient in the algid stage is a positive phenomenon, sensible not only to the patient, but to the hand of the bystander, and demonstrable by the thermometer. The temperature of external parts falls to the extent of two or more degrees below the healthy standard (98° Fahr.) : I have myself not noticed it below 96°, but it is recorded (Thompson) to have fallen so low as 92°.

The *feeling* of cold is one that causes great misery and distress to the patient. The face is pinched, shrunken, and anxious, he lies cowering under the bedclothes; loudly audible chattering of the teeth, and a shaking of the whole person, sufficient to cause the bed and all about it to vibrate strongly, are met with in extreme cases. The diminution in volume of external parts is sensibly marked by the falling off of rings; the fingers become shrivelled up and wrinkled like the washerwoman's fingers, and the skin generally assumes the rough wrinkled state called *cutis anserina*, or goose's skin.

The duration of these phenomena, constituting the algid period, is very varied; they may last for a day, or even more, or be terminated within an hour; from six to eight hours may be regarded as the average. Headache, temporal or general, pains in the eyeballs, aching in the back, loins, or extremities, nausea, with or without vomiting, uneasiness, distress, or pains in the epigastrium or other parts of the abdomen, are sometimes present during the algid period; diarrhœa is an occasional but not constant symptom, constipation being just as often observable.

Period of reaction.—To the algid stage succeeds that of reaction; the pulse now rises in frequency, its force and volume are increased; it sometimes acquires great tension and hardness, but not infrequently remains soft and full. Vascular excitement is observable throughout the system, the cardiac impulse is increased in strength and fulness, the carotids and temporal arteries beat with much force, and the throbbing of the vessels of the head and neck, and especially of the temporal arteries, is a symptom often most distressing to the patient. The face becomes hot and flushed, the eyes prominent and lustrous, and they are occasionally bloodshot and red. The surface of the body is hot, a sense of heat and suffocation oppresses the patient, and an actual elevation of temperature is recognisable by the hand, and its amount may be measured by the thermometer. The temperature under the tongue, in the axilla, or in the anus, ranges from four to six degrees above the standard of health; it has been noted at 102°, 104°, and even so high as 107° Fahr. The skin feels pungently hot, giving the sensation known as *calor mordax*, or biting heat. Some wandering or delirium is not infrequently present at this stage; the patient becomes more hot and uncomfortable towards evening, and may rave during the night. Violent delirium is occasionally to be met with in these cases, the patient being restless, struggling to get out of bed, and with difficulty kept in the recumbent position.

At this period the bowels are generally confined, and the urine is high-coloured and scanty.

The assemblage of symptoms now specified may be variously grouped in different cases, and more or less modified as to their order of succession and their intensity and duration. The pyrexial or febrile state, thus constituted, when once established in the system, is continuous and uninterrupted throughout, till brought to a termination in some of the ways to be now noticed.

After being protracted for a period which may vary from one day, or even half a day, to one, two, or more weeks, the febrile state is brought to an issue, in some cases rapidly, and with a sudden arrest of its chief symptoms; in others slowly, and by the gradual cessation or wearing out, as it were, of the principal phenomena. The former mode of termination is that known as crisis; the essential characteristic of which seems to be a more or less copious evacuation from the system, either through the ordinary channels or through some unusual one. The most frequent mode of termination of the pyrexial action is by the sudden occurrence of a copious and universal sweat. The dry and hot skin becomes soft and relaxed, the cutaneous pores expand, and a general diaphoresis is established, which may last for hours, or even the better part of a day (or night), and during which a large amount of fluid is drained off from the system. Drops of perspiration stand out upon the skin, and little streamlets may be observed to course along the surface. The patient's night-dress, the bedclothes, and bed become saturated with moisture, and in extreme cases water trickles through the bed upon the floor, where it collects in small but visible pools. It is impossible to calculate accurately the amount of fluid thus drained off by the skin, which in some cases must be very great, and it is always considerable when marked relief of the pyrexial symptoms is to be anticipated.

During or after the sweat the patient drops quietly asleep, and perhaps now, for the first time for many days, gets some hours of tranquil and refreshing rest. He awakes a new man, free from all fever, feeling cool, refreshed, and invigorated; the nervous depression and vascular excitement are gone, he sits up in the bed, craves for food, and but for the debility which commonly remains behind for some days, shows little traces of his late illness.

Such is the course of things in a case terminating favourably with crisis by sweating.

In other instances the same end is attained by an unusually free flow of urine, highly charged with salts, urea, and organic matter in other forms.

A smart attack of diarrhœa occasionally seems the mode in which crisis is brought about. In still rarer cases the sudden occurrence of a hæmorrhage from the nose, mouth, urethra, or anus, is attended with marked relief of the febrile symptoms, and is, consequently, regarded as a mode in which crisis may occur.

Termination by crisis, in the manner just indicated, is to be regarded as a usual, but by no means constant occurrence. The older writers paid the most minute attention to the subject of critical days; and from their works we may gather that crisis was the all but universal mode of termination of the fevers of their day. In a very considerable number of cases now to be met with, there appears to be no distinct crisis, and the pyrexial action gradnally subsides.

Such is a general outline of the ordinary course of a case of simple continued fever. It is usually a disease free from positive danger to life, but may present complications of a formidable kind. It is at all times an affection requiring judicious care and management on the part of the physician. The therapeutics of continued fever may be best considered after we shall have studied other varieties of the disease.

SYNOCHA.

Synochal Angiotenic, or Inflammatory fever, is described by the older authors as a disease of uncertain duration; thus we meet with varieties of it designated ephemeral, and in which crisis seems to have been established on the second, third, fourth or fifth day. Pinel says it may terminate in twenty-four to forty-eight hours, or go on to the fourth, seventh, ninth, eleventh, or fourteenth day. There is some reason to believe that the pyrexial reaction attendant on obscure internal inflammations was not infrequently taken for an essential fever, at a time when the diagnosis of the inflammatory lesions of the great cavities was less advanced than it is at present. On the other hand, we cannot accept the wholesale reversion of the concurrent opinion of ages implied in the rejection of synocha, or inflammatory fever, from the category of true fevers; nor can we agree with the arrogant assumptions of the French school, that a gastro-enterite will explain all the phenomena of epidemics denoted at various times and by very different authors as synocha.

The followers of Broussais, not content with regarding the fevers presented to their own eyes as caused by a gastro-enteritis, aspired to pass a chastening hand over the works of the great fathers of medicine, from the days of Hippocrates to the most recent times, and to interpret with the light of a new pathology, not alone the hypotheses, but the facts and observations of all past schools and time. To this age of sceptics and doctrinaires, however, has succeeded a class of observers who, with not less strict and rational views of medicine, unite a more just consideration and respect for what has been left to us by the master-minds of our art from a past day.

Predisposing causes of Synocha.—The following are the occasional and predisposing causes assigned by Pinel and others for the production of inflammatory fever;—youth, the period of puberty, sanguine temperament, plethora, period of first menstruation, gestation, childbirth, considerable wounds or injuries, warm and dry, or cold and dry atmosphere, winter, spring, exposure to the sun, sudden change from heat to cold, abuse of stimulants, excess in food, habitual use of succulent aliments, change in mode of life, unwonted physical or mental exertion, suppression of hæmorrhages, retention of the menses, strong passion, love carried to excess, reverse of fortune, and accidental causes, such as result from peculiarity of dwelling-place, occupations like that of a baker or fireman, residence in hot climates, and exposure to certain winds, the north in one locality, the east in another.

Synocha is a form of continued fever of which we meet but few well-marked examples in the present day. Some persons have even gone so far as to doubt altogether the existence of any distinct type of fever corresponding to that described by the older writers under the term *Synocha*. This is, however, in my opinion, pushing scepticism too far; it cannot be argued, that because we do not find disease in the present day to correspond with the accounts of it transmitted to us by the older authors of medicine, no such type of morbid action has existed at a former time, or may not exist under circumstances other than those with which our own limited experience brings us in contact. For myself, I can only say, that I see no reason to doubt of the existence of synochal fever; I have met with it from time to time in this country, and I have seen well-marked examples of it in southern and eastern Europe.

Synocha has perhaps never been a fever largely prevalent in these countries. McBride, than who there can be no better authority, while he does not deny the existence of synocha, says that inflammatory fever was rare in Ireland in his day.

Synocha, or inflammatory fever, may be described as a disease having well-marked periods of rigors; the pain in the back, headache, and the sensations in the extremities, which are well and briefly described by the French under the term *brisement des membres*, are usually well marked; these latter sensations are what our patients endeavour to describe, when they speak of feeling as if soundly beaten all over with a stick. This stage, of course, varies much in duration, as well as in the severity of its symptoms, but it is usually succeeded by a state of pyrexial reaction within twenty-four hours, not counting of course the period of incubation, or that during which the patient is said to be breeding the disease. This period, as we know, may extend over two, three, or more days before the actual commencement of rigors, and during this time (that of incubation) the patient may complain only of those indistinct and ill-defined sensations known as *malaise*, and which imply general lassitude, impairment of mental and bodily powers, and incapacity for the ordinary avocations of life.

The pyrexial reaction in synocha is usually very intense and rapidly developed; the pain, heat, and throbbing in the temples are excessive, the surface of the skin generally is parched, and gives the sensation of burning and biting heat known as *calor mordax*.

The phenomena presented in cases of this kind are very numerous and various, and they may implicate almost all the organs and functions in the body; they may be more in one case and less in another, they may all co-exist with uniform intensity, or one set of them may preponderate to the almost total exclusion of the rest. Each individual case, it can be readily conceived, will take its special character and importance from the aggravation or preponderance of two or more of the several sets of phenomena which we are about to consider. Now, instead of regarding the several phenomena presented in the case of synochal fever as a chance-medley, as is too commonly done, let us see if we cannot reduce them to some simple order, consistent with a rational pathology of fever. This, it will be subsequently seen, is not merely a matter of scientific interest, but will much aid us in the selection of appropriate therapeutical remedies when we come to speak of the treatment of the disease. The principal symptoms may be classified as follows:—

I. Symptoms referable to deranged states of the nervous system, and including the phenomena of rigors, pains in the back and limbs, headache, giddiness, indistinctness of vision, intolerance of light, pains in the eyeball, in the forehead or occiput, sleeplessness, restlessness, and delirium.

II. Symptoms referable to the circulating system, including quick, full, hard, and sometimes vibrating and bounding pulse, general vascular reaction, giving rise to increased temperature in both external and internal parts, the thermometer in the mouth, axilla, groin, anus, or vagina, standing at 103°, 104°, or 105° Fahr., and possibly, in extreme cases, two or three degrees higher. Flushings of the face, throbbing of the temples, violent irritative action of the heart, occasionally of the carotids, likewise belong to this set of symptoms.

III. Symptoms referable to derangements of the *primæ viæ*, including more particularly those due to morbid states of the buccal, lingual, gastric, and intestinal mucous surfaces. Under this last head are comprised the several varieties of foul and coated tongue, nausea, vomiting, gastric anxiety, pain and tenderness, and those irritative states of the mucous membrane of the large and small intestines, and which, on the one hand, give rise to constipation, flatulence and tormina, and on the other, to some form of diarrhœa.

IV. Symptoms which may be referred to increased action of the excretory organs; these, in a general way, embrace the phenomena of excretion, by the cutaneous system, the pulmonary surface, the gastro-intestinal mucous surface, and lastly, and, in some respects, most important of all, the renal excretory apparatus. Under this last head we have to consider the several conditions presented by the urinary secretion, as to increase or diminution in quantity, density, and the relative or positive amount of its ordinary ingredients, or it may be of elements not usually eliminated through this channel. The whole of this set of phenomena acquires an importance, and must receive an interpretation at our hands quite different from that usually assigned to them. It will be seen that from the view we have taken of the general pathology of febrile action, the increased metamorphoses of the tissues, or, in other words, more active wear and tear of the animal machinery, lead necessarily to increased consumption of the various constituents of the tissues of the body, which, as in the case of machines in the ordinary world, must find a visible and tangible representation.

This representation of the wear and tear of the animal system in fevers is to be found, as we have shown, in visible, tangible, and even ponderable form, in the increased excretory matter thrown off from the various emunctory organs, such as the skin, pulmonary and intestinal surfaces, and such organs as the kidneys.*

We have stated that the phenomena of synochal fever are usually developed with great intensity and with remarkable rapidity. Without confining ourselves to any narrow or stereotyped view of the disease, it will be found that the course of a synocha or inflammatory fever presents a natural and obvious division into three distinct periods or stages; that of rigors, that of pyrexial reaction, and that of the crisis or termination of the disease. The first stage is that of rigors, with *cutis anserina*, shrivelling of the fingers, diminished temperature in external parts to one or two degrees, as indicated by the thermometer, and sensations of more severe cold on the part of the patient, great scantiness of the urine, or partial suppression of this secretion, with headache, pain in the back, and many other phenomena due to diminished or paralysed innervation, and which, as we have before explained, vary much in different cases. The second stage is that of pyrexial reaction, in which there is evidence of great vascular excitement, and the system is, for the time being, so to speak, acting *above par*, and may be compared to a machine working at high pressure speed, and thus by the increased friction, or wear and tear of its component parts, endangering the safety of the whole. It is at this period that we find most severely complained of such symptoms as heat, intolerance of light, headache, throbbing of the temples, and excessive action of the heart, carotids, or other parts of the vascular system, with delirium at night, sleeplessness, and violent efforts to get out of bed; these efforts often call for personal restraint, as they tend to wear out and exhaust the patient, and often leave him in a state of great prostration; all restraint in such cases, however, must be used with judgment and discretion, and while it is firm, must be devoid of unnecessary rudeness or violence. The duration of this stage is not very positively defined; it may last five, seven, or ten days, during which vascular action continues unabated, and the pulse may present fulness, hardness, and great reaction against the finger, for nearly the whole of this period. Attendance on cases of this kind often presents grave anxiety for the junior physician, and though not on the whole formidable cases, for the proportion of mortality which they present is not very large, they sometimes prove fatal in a manner for which the junior physician is not prepared. Those cases in which the head symptoms preponderate, with throbbing of the temples, violent headache, delirium, and sleeplessness, are not unfrequently regarded by the public as "*brain fever*," a name fraught with every conceivable association of horror and fatality. Erroneous impressions of this kind are pardonable enough on the part of anxious and interested friends, but what shall we say of the ignorance or slothfulness of some physicians, who still allow themselves to be influenced by such pathological mystifications, and whose experience of disease seems to be drawn from the crude theories of the public, rather than from the exact results of pathological investigations. It is true that Clutterbuck, a man of no mean name and authority in his own day, regarded synocha or inflammatory fever as having its anatomical seat in a *phrenitis*, or inflammation of the brain. Within our own day, Bouillaud considered this fever as the result of an *angio-carditis*, or general inflammation of the lining membrane of the heart and great vessels. Now, if we appeal to pathological experience, is there any evidence that the head symptoms, which present themselves in the course of the synochal or other fever, depend upon any state of inflammation of the cerebrum or its membranes? Doubtless we shall find in some cases that, both during life and after death, unequivocal proof of the inflammation of the brain or its appendages shall be present in synochal as well as in other fevers; when present, however, such affections are only examples of the occasional, inconstant, secondary lesions, which occur now in this organ, now in that. That such a symptom as delirium is no evidence of inflammation of the brain in the course of a fever, is well shown by the following results obtained by Louis.

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* It may seem that the reiteration of the views here urged with respect to the pathology of fevers is continued almost *usque ad nauseam;* but the writer believes strongly in the necessity of keeping these doctrines perpetually in view, if we desire to interpret rationally, and in the relation of cause and effect, the several complicated phenomena presented in the course of an ordinary fever. It is also desired that, if any section of this work be studied separately (as so often happens with works of the kind), the reader may not fail to receive full and just notions of the general pathology of fever.

Of twelve fatal cases of fever in which, during life, no delirium or other prominent head symptom had been observed, the brain was found to be perfectly healthy in six on post-mortem examination; in four the cerebral substance was red, and in two the brain was slightly softened; that is to say, that in half the cases presenting no delirium or other prominent head symptom during life, there was found, post-mortem, a slight departure from the healthy state of the brain. In twelve other cases, which presented delirium and other prominent head symptoms, five exhibited, on post-mortem examination, a perfectly normal condition of the brain and its membranes; in five there was slight redness of the brain; in one, slight injection; and in one, slight softening: that is to say, in twelve cases, all presenting delirium, nearly half showed no trace of anatomical lesion of an inflammatory kind, or otherwise, to account for the symptoms during life. It is a legitimate conclusion from these statistics, that delirium and inflammation of the brain have no necessary connection with each other in fever, that we cannot argue from the presence of the one to the existence of the other, and that we are not warranted in employing the treatment appropriate to inflammation of the brain or its membranes in cases of fever with delirium.

With these results before us, we must be slow to regard throbbing of the temples, heat and flushings of the head and face, pain in the eye-balls and forehead, intolerance of light, sleeplessness, and delirium, as indicative of inflammation of the brain; and we must be equally slow to bleed, purge, or otherwise lower the system in cases presenting such phenomena. We know from experience that antiphlogistic treatment will not answer in these cases, and that for two reasons: first, it will not relieve, and may possibly aggravate such symptoms as we have above detailed; in the second place,—and this holds especially with regard to the cases we meet in these countries, depletory measures often unquestionably tend to lower the tone of diseased action, without putting an end to it, and to convert a well-developed sthenic pyrexia, having little of real danger about it, into a condition of low typhoid action, with great sinking of the vital powers, and from which it will be impossible, at a subsequent stage, to save the patient, by even the most bold and unlimited use of stimulants.

The phenomena which we meet in cases of synochal fever, referable to the circulating system, are often well marked. They comprise, as already stated, violent cardiac action, sometimes to the extent of strongly vibratile or pounding pulsation of the ventricles, the shock of which is painfully felt by the patient himself throughout the chest, and in the vessels of the head and neck. In extreme cases of this kind the force and tension of the whole vascular system are raised to an extraordinary degree. The patient is in a highly irritable state, and complains of intense heat, and a bursting sensation in the head, body, and extremities. *Calor mordax* is present to a marked degree; the eyes assume a glistening, fierce, and ardent expression, the cheek bones are suffused with a bright scarlet tinge, the palms of the hands and the soles of the feet are parched and burning to the patient's feelings, and indicate positive increase of temperature to the physician's hand or thermometer. Heat is the dominant characteristic of this state, and this is the condition which best realises for us the καῦσις, or *febris ardens*, of the Greek and Latin authors.

There is usually no relief to these symptoms, often extremely distressing, until a copious sweat supervenes spontaneously, or is brought about by the action of diaphoretic medicines. The pulse is usually about

120 in the minute; it is full, sometimes hard, and often bounding under the fingers; it resists compression, and even when pressed with much force by the fingers, it is with difficulty entirely obliterated, the part of the vessel immediately above the point of the vessel impinging forcibly against the finger, with that kind of action which we denote by saying, "the pulse has got a kick in it." It is well worthy of remark that in the class of cases now under consideration, the force and tension of the vascular system are uniform throughout the whole of the circulating apparatus; thus, if the heart be acting with violent throbbing pulsation, the carotids, radials, and femorals will be found acting with corresponding force and volume. We have not, then, in synochal fevers,—and this is to the experienced physician an important indication for prognosis,—that remarkable contrast between the force and volume of the pulse and the cardiac impulses, which we know to be of such frequent occurrence and such bad augury in the typhous types of fever.

It is undoubtedly to this excited state of the vascular system in synochal fevers that we must trace the origin of depletion by bleeding in this class of cases. It seems no unnatural conclusion to think that there is too much blood in the system, when we find the vessels in all parts of the body within our reach of apparently increased volume, and acting with more than redoubled energy; and when we also have so many other presumable evidences of disturbances in the equilibrium of the blood's circulation, coupled with apparent increase in quantity as well as of change in quality of the circulating fluid. It was an obvious conclusion, but one based upon superficial analogy and erroneous pathology, to believe that by reducing the amount of the blood in circulation in the vessels, by abstracting one or two pints directly from a vein, we could control the diseased state and correct the morbid process going on in the system. It is experience alone that could supply an irrefutable answer to such plausible *à priori* reasoning. The best practitioners are now satisfied, from the results of experience, that abstraction of blood by general venesection will not answer the purposes intended. Now we do not mean to contend that venesection is not applicable and useful in certain cases, but, as rational pathologists, we cannot admit that venesection will cure a fever in the only way, and in the only sense, in which we conceive that such an operation can be effected. Fever, in our views, implies increased action in all parts of the system, the vascular apparatus included; it implies increased wear and tear of the tissues, and the production of a greater quantity of effete material, resulting from the increased metamorphosis of the tissues. To cure the fever, nature or art can employ but one means, viz. to carry off from the system, through one or more of the emunctory channels, the effete materials above indicated. It will be said that these effete materials find their way into the blood in the first instance, and that in this way we have a direct means of eliminating them from the body by the process of venesection. This, no doubt, would be true, if we could abstract by bleeding all the impure and contaminated blood, and throw into the patient's veins and arteries a new, pure, and healthy blood to replace his own. But it will be seen at once, that in withdrawing by venesection a pound or so of blood, we are really only eliminating about a thirtieth part of the impure and effete material which has found its way into the circulation. This argument, if followed to its legitimate logical conclusion, must satisfy any rational pathologist that venesection, however extensive, can never be anything more than a very partial and imperfect means of getting rid of the chief results which febrile action produces in the system. As a depurative and eliminative agency, it cannot be for a moment compared to such a general and extensive one as that performed in the progress of sweating, continued for even a very few hours. Nor, again, is the efficacy of venesection in this respect at all comparable with that of an eliminative function, such as is performed by the kidneys in the course of two or three hours.

In the case of a surface like that of the pulmonary membrane, that of the intestines, that of the skin, or that of the kidneys, the whole mass of the circulating blood passes and repasses over and over again upon a sieve-like apparatus, which admits of the transudation of the effete and noxious materials from the blood stream. Under these circumstances the course of the blood, surcharged with the effete materials produced by the consumption of the tissues in fevers, may be compared to a stream which, impregnated with earthy particles, silt, and other impurities, deposits them in various points of its course, and then flows on pure and limpid. Such analogies as these must, however, not be pushed too far: the lungs eliminating carbonic acid and hydrogen; the skin throwing off water, salts, ammonia, and other compounds; the kidneys carrying off urea, uric acid, chlorides, sulphur, phosphates, and their allied bases; and the intestinal canal acting as the common sewer of the system, play the part of so many strainers or purifiers. We must not forget, however, that in a highly complicated machine like the animal body, each part reacts upon all the others, and the blood itself, when rendered impure, will in its turn influence the nervous centres, which stimulate the vascular system and the other parts engaged in the febrile process. It is under this view that venesection may be defended when employed with the object of lessening the amount of stimulant fluid, " impure fluid," which is reacting on the nervous centres, and thus adding fuel to the fire, and keeping up the cycle of pyrexial actions. We do not deny, then, that there are cases in which a bold and early venesection may have the effect of partially arresting the process of febrile actions, or of preventing them from spreading to a wider circle of parts. Mark, however, that in this aspect bleeding answers but one purpose ; it may control, but it cannot cure the fever. Febrile action, if continued only for an hour, produces effete material, as the burning of coal or wood produces ashes. The pathological or febrile ashes must be eliminated from the system : bleeding cannot, in any conceivable way, effect this object; it can only be accomplished by elimination through the pulmonary surface, the skin, the intestines, or the kidneys, acting singly or in combination.

The third period of a synochal fever is that in which a *lysis*, or solution or termination of the disease, is brought about, either by the spontaneous efforts of nature or by the agency of medicine. It is not at all unusual to find that, in the present day, febrile diseases come to an issue by a gradual fading and diminution of the symptoms one by one. It is probable that in these cases a slow but regular elimination of the various effete materials produced by the febrile action takes place in an almost insensible manner, the process being extended over many days. We can readily suppose that at a certain period of a fever, when effete materials are accumulated to a certain extent, the several emunctory organs, such as the pulmonary surface, skin, intestinal and renal apparatus, begin to eliminate, with a slightly increased activity, and, after the lapse of a few days, silently but effectively throw off from the system the *materia peccans.* What shall we say of the doings of the ignorant physician, who, incapable of understanding the delicate play and nice balance of the finely adjusted animal mechanism, by his meddling interference and blundering nostrums, disturbs the equilibrium of the various organs, arrests or paralyses the activity of one, or suspends the functions of all. And yet, in no class of cases more than in fevers, do we find injurious effects from the *nimia diligentia medici.* In marked contrast to this gradual and silent subsidence, as it were, of the febrile actions, we find another mode, in which they are brought to a termination in a rapid and striking manner, by the process known as *crisis.* We leave a case to-day in a condition of delirium and full pyrexial reaction, with high nervous excitement, the vascular system in a state of extreme tension, the skin hot, and all the symptoms of ardent fever well marked. And yet a few hours may restore the patient to a state of almost complete convalescence, with general tranquillity of the system, clear intellect, cool skin, the pulse at its natural standard, and all parts performing their functions in a perfectly healthy manner.

The pathological explanation of this process is, that a sudden, copious, and complete elimination of effete material has been brought about by one or two or more channels: thus we shall find that the patient has been affected with a most abundant diaphoresis; or that a smart diarrhœa has survened; or again, an excessive deposit has taken place in the urinary secretion. In other cases a lysis or crisis of the disease seems to be brought about by the occurrence of a hæmorrhage from some particular part or organ. In this way we find, occasionally, that an epistaxis, or bleeding from the nose, or again, a transudation of blood from the intestinal mucous surface, is attended by relief of all the febrile symptoms, and seems to take the part of a true crisis. Much attention was paid by the older physicians to the subject of crisis, and with them it played a far more important part than our experience warrants us in assigning to it in the present day. The doctrine of critical days has been a much vexed question in the schools. Fever was supposed to be a diseased action, obeying certain laws of periodicity with a precision truly marvellous. The tendency to a natural issue of the disease by crisis, on certain days, was regarded as a kind of morbid law in the system. Certain days from the commencement of the disease were especially regarded as critical, and if the crisis by sweat, urinary deposit, or diarrhœa did not fall exactly upon an orthodox critical day, there was much temptation to ante-date or post-date the commencement of the disease, and thus to make facts square with theory. The most favourite critical days were the 5th, 7th, 11th, 14th, and 21st. We are far from denying that at certain periods febrile disease presents an unmistakable tendency to terminate on critical days; but we think that it is consistent with observation to state that a critical issue of fever, and the sudden termination of pyrexial symptoms, after a process of sweating, diarrhœa, increased urinary elimination, or accidental mucous hæmorrhage, is far less common in our day than it once was.

In a clinical point of view, synocha is to be regarded, when it presents itself to our view in the present day, as a type of pyrexia, in which the system is acting above par, the fever is high, the nervous and vascular tension is sustained throughout, and there is an absence of any tendency to sinking and death by asthenia. In this regard synocha is divided by a broad line of demarcation from fevers of the typhous type. The febrile action is higher in synocha than in the common continued fever; the duration of synocha is likewise less than that of the latter disease; its ordinary period seem to be from ten to fourteen days. Cases in which synochal fever is developed with intensity, present much anxiety to the physician; a fatal issue, though not common, must be borne in mind as a very possible occurrence; the assemblage of symptoms presented is often very alarming; this is especially so when we have to deal with patients in whom the head symptoms predominate, with delirium, sleeplessness, nervous excitability, violent or sledge-hammer pulsation of the heart, and with intense heat of skin. How are we to acquit ourselves in cases of this kind, when, by the importunities of friends, we are urged to commit ourselves to a prognosis?

Till the junior physician has the responsibility of such a case upon his own shoulders, he can little appreciate the gravity of such a question as this, plied and replied with all the urgent solicitude of an anxious mother or wife, " Doctor, what's your opinion of him to-day, do you think he'll get over it ? " A haphazard opinion will not do in such a case; it may compromise your character and prospects in one or other of two (to the inexperienced physician) very unexpected ways. The case may be brought to a rapid end within forty-eight hours, by the fatal effects of uneliminated poison and effete materials upon the system. The vital thread, so highly strung, snaps suddenly from excessive tension. If unprepared for such a result, and that an incautious opinion betrays your ignorance, you will be a fortunate man if the generous public do not lay at your door the responsibility of such a case. Suppose it to happen in the person of an individual of some public station and notoriety in his local circle ; and you can understand yourselves what the effects will be. On the other hand, what will be your position if you have unnecessarily raised. alarm amongst parents and relatives, in a case in which an unexpected crisis by sweat, diarrhœa, or urinary deposit, brings the patient to a state of almost complete convalescence within twenty-four hours, and thus gives the lie to your lugubrious prognostications of the day before ?

A sound and reliable opinion is to be formed in fever cases only from a full consideration of all the symptoms present, based on a rational conception of their true pathological significance. Cases in which the action in the system is uniform and well-balanced in all the organs and functions, may be regarded as comparatively safe ; those, on the other hand, in which there is an excessive preponderance of one set of actions, must be viewed with suspicion, if not alarm. While all parts of the machine are working with uniform pressure, though at a high velocity, its safety is not immediately endangered.

Cases with preponderating and excessive action of the nervous system, delirium by day and night, sleeplessness, and violent efforts to get out of bed, are full of danger, and till some hours of quiet sleep have been obtained, cannot be for a moment regarded as safe. Cases with violent action of the heart and vessels are likewise of a very treacherous character. Cases with hot skin, and early and abortive sweats, are likewise often fatal. The phenomena of sweating require to be carefully studied. In the language of Sydenham, it is only those sweats which are the result of "coction" or digestion of the *materia morbifica*, that are available for crisis. Short and early sweats, that is to say, those occurring before the seventh day, are seldom effective in lowering the rate of the pulse or heat of the skin, and they are often indicative of mischief to come. Partial sweats, in like manner, as those of the head, face, or chest, are seldom favourable, often the contrary.

All practical physicians must be aware of the fact, that sweating is not infrequently a symptom of most unfavourable augury in all kinds of fevers. This is especially the case with the sweats which occur in connection with weakened and accelerated pulse. We shall have again to speak of this variety of sweat when dealing with typhus. In this form of fever we know that sweating, with a pulse rising from 100 to 120, 130, or even 140, is about the most unfavourable prognostic with which we are acquainted.

In general, it may be said that sweats, which after twelve or twenty-four hours are unaccompanied with marked diminution of the febrile state, *i. e.* lesser temperature and pulse rate, are hurtful rather than otherwise. We must remember that sweating is an essential characteristic, and a very grave and depressing complication in rheumatic fever, and in the sweating or miliary fever, in which we have it recurring day after day, without diminution of the febrile state, and often with great aggravation of all the symptoms. We cannot, therefore, regard sweating as a curative process *per se.* And this, be it observed, holds good in reference to sweats produced by natural action, and those artificially induced, whether therapeutically or not. We often see a patient for many hours suffering from fatigue and distressing heat attended by sweats, due to the weight of the bed-clothes, the close atmosphere of his bed-room, or the season of the year; and yet, so far from any cooling effect being produced, we find perhaps a nocturnal exacerbation, and the patient for many days afterwards in a state of increased pyrexial irritation. We may draw from all these considerations the following practical conclusions:—

1st. That sweating is not a salutary process, when it occurs prematurely, or when it is brought about too early by artificial means, such as clothing, confined atmosphere of the room, or, again, by therapeutic agents.

2nd. That sweating is to be regarded as a safe and reliable therapeutic and curative process only when it forms part of a general eliminative action in the system.

Complications in Synocha.

Synocha is a fever which does not present any remarkable tendency to secondary complications. The head symptoms doubtless sometimes present great severity, and, as already noted, give the preponderating feature to the disease. When such is the case, the fever, as before stated, is sure to be regarded as cerebral or brain fever, and the doctrines of inflammation have so impressed themselves upon the mind of the public and the profession, that the well-educated physician often requires great moral courage and steadfastness of purpose to abstain from extensive local or general venesection in the clamour for depletory measures that assails him. We can only again refer to what has been already said on this subject. Cases will undoubtedly be met with from time to time in which there is a plethora of the cerebral vessels; cases may likewise occasionally be met with in which there is true inflammatory action in the brain or its membranes, and which must be treated accordingly.

A set of symptoms, referable to the alimentary tract, sometimes causes considerable distress in cases of synocha. The tongue is very foul, thickly coated, and furred; there is much uneasiness, with sense of fulness and distress, if not positive pain, in the epigastric region; nausea and vomiting may be present to a marked degree, and be a source of great additional suffering. Fulness of the abdomen, with various symptoms of intestinal irritation may also be present. Many of these symptoms are doubtless to be referred to an overloaded state of the intestinal canal at the period when the patient was seized by the fever. The foul and furred tongue, the *status gastricus saburralis*, or state of the stomach, with foul eructations, and the *diarrhœa crapulosa* of the older authors, are to be explained as the result of a salutary effort to get rid of ill-digested and fermenting substances which load the alimentary canal.

Treatment of Synocha.

We are now in a position to take up the consideration, in a systematic way, of the therapeutics of synocha or inflammatory fever. We have already disposed of some of the considerations which affect the question of bleeding in this variety of fever. It will have been seen that we are not advocates for indiscriminate bleeding, in this or any other kind of fever; yet we cannot be blind to the fact, that in many countries of Europe venesection is in common use as the primary means of treating varieties of this fever. It might no doubt be logically maintained, that in these cases bleeding was only an indifferent remedy, and that where robust constitutions, and a type of disease devoid of any sinking tendency, are in question, a bleeding to fifteen or sixteen ounces has no effect upon the case, one way or other, and that the patients are just as little influenced by a bleeding to the above extent when in fever, as they are known to be when bled in a state of health at certain seasons of the year. As a popular hygienic means, bleeding has long been in use in many countries in the spring time. In cases of synocha, with manifest overaction of the vascular system, and determination to the head, bleeding from the arm will in certain instances be useful in controlling the excitement of the heart and arteries. In the cases which we meet in these countries, venesection to the extent of sixteen to twenty ounces may be considered as a very reasonable depletion. We must ever bear in mind the tendency which our cases so constantly exhibit to low typhoid action in the secondary periods of their course, no matter how sharp and violent the symptoms may have been at the outset. However, cases may occur in which even a second bleeding may be requisite; beyond this I should deem it hazardous to go, though I am cognisant of the fact, that even in fevers of still lower type, venesection has been employed with impunity to the extent of fifty ounces in individual cases.

Leeches to the temples, when there is pain, with heat, and throbbing of the head, are decidedly useful; two, three, or more leeches may be applied, according to the urgency of the symptoms: six leeches to each temple will effect what I should regard as a full depletion. If I mention bleeding from the temporal arteries, it is only to give it my most unqualified condemnation, and that for several reasons. Firstly, blood from the temporal arteries comes directly from the heart, not from the cranial cavity or brain. Secondly, the mechanical difficulties which attend efforts to repress bleeding from the temporal arteries, and the pathological consequences so often entailed, constitute additional, and by no means unimportant objections. In using general and local depletion, it will be necessary to watch carefully the effects upon the pulse. Diminution in the rate and tension of the pulse, and a cooling of the skin, are to be looked on as favourable results. Supposing the pulse to range in these cases from 110 to 120, we may consider a fall of ten or fifteen beats as an important impression made upon the disease; but our indications may more safely be drawn from diminution of the force and tension than the rate of the arterial beat. These are characters best acquired in clinical practice, and by no means easy of description. What we are to expect is, that the pulse shall lose any hardness and vibratile and jerking character which it may have, and especially that particular jerking reaction against the fingers which we have called "a kick;" that it shall become soft, yet retain its natural resiliency; that it shall be uniform and of moderate volume, without anything of a hard and cordlike feel. In regard to the head symptoms, the pain, heat, throbbing, and other sensations will perhaps be best measured by the patient's own feelings. Such symptoms as delirium, sleeplessness, the condition of general excitability, and the state of the intellectual faculties, must of course be estimated by the physician. The expression of the countenance, the characters presented by the eye as to prominence, preternatural lustre, or suffusion, or brilliancy, and fixity of gaze, mildness, sternness, or ferocity of expression, or the contrary, as dulness and vacancy, must all be taken carefully into account; the state of the pupil likewise must be noted as to dilatation or contraction. Cold lotions to the head will often be found useful in cases of temporary cerebral congestion. Where there is a decided preponderance of head symptoms, it may be advisable to shave the head, but this is a proceeding that must not be too hastily adopted. Cold affusion, especially if water be poured on the head from a height, is a powerful means of producing an immediate impression, but if carried to too great a length, defeats its object by inducing excessive reaction. Cooling lotions of various kinds have decided effect where there is sensible heat of the head: refrigerating mixtures are still more active; and the ice-cap applied on the shaven crown is a most excellent remedy for severe cases.

The violence of the head symptoms, the wild delirium, and the difficulty of restraining the patient in bed, often constitute very grave and serious complications. When venesection and leeches to the temples fail to give relief in such cases, shaving the head and the application of the ice-cap must be tried. Counter-irritation to the head by blisters, or otherwise, must be used with great caution; such applications sometimes have a stimulant instead of a sedative effect. Accident and self-inflicted violence must be carefully guarded against in these cases; I am myself opposed to the use of the strait-waistcoat, except when other means entirely fail to control the patient. While this state of cerebral excitement lasts, the patient must not be left alone for a single instant by day or by night; much depends in the management of such cases on the vigilance, personal energy, and zeal of a faithful nurse. Such an auxiliary is at once invaluable and indispensable; and there are many cases, both in hospital and private practice, in which it would be rash, if not impossible, for the physician to combat disease without the aid of an experienced nurse. The delirious patient in fever is often controllable by the personal energies of his nurse, and made amenable to her commands to a remarkable degree; *she plays a part only second to that of the physician.*

Arrosion with a watering-pot has been practised in cases with violent head symptoms; the external use of water, or wet cloths applied to the surface, is undoubtedly a powerful therapeutic means. We cannot, however, enter here into a discussion of hydropathic therapeutics; we do not deny the efficacy of such means, so far as they go, but what cannot be controverted is, that while increased cutaneous elimination is the chief if not exclusive result of hydropathic agencies, it answers only one of the many ends which must be met to cure such a general systemic process as fever.

The use of emetics has had an extensive vogue, both in past and recent times, for the cure of this class of fevers; it has even been thought that the effect of emetics was still more energetic, and that it was possible by their action to cut short the febrile process. It was conceived by the advocates of this view, that in this manner a kind of abortion of the febrile state could be effected. There can be no doubt that a strong emetic of the potassio-tartrate of antimony, sulphate of zinc, ipecacuanha, or mustard, may give a powerful revulsion to the nervous system through the gastric filaments of the vagi; and it may be that in the minor febrile states it will be found possible to arrest the pyrexial action by such means. However, that emetics may be effectual to produce this arrest or abortion of the febrile state, they must be administered at the earliest possible moment, and before the complicated train of actions which constitute fever is established. It is extremely rarely that we meet with cases in the nick of time, to use emetics with the above intent; more commonly the febrile state is well set up, if not fully established, when the physician is called in. At such a period emetics can have only a minor object in view, that of unloading the stomach of any crude ingesta that it may still retain.

Experience shows us that emetics used at this juncture generally produce only distressing vomiting, gastric irritation, and it may be a state of sub-acute gastritis, with incapacity of retaining food or medicine, all which symptoms tend much to complicate the case, and to render the subsequent progress of it very often troublesome and sometimes hazardous. It will be in the recollection of almost every practical physician, that he has seen cases in which obstinate gastric irritation and incapacity of retaining food or medicine have been directly traceable to the abuse of the emetic treatment of fevers. It is not to be argued from anything here stated that the use of emetics is condemned without qualification. Emetics are useful in this class of fevers when the cases are seen very early, that is, before the full development of the pyrexial state, and when administered with caution.

The use of purgatives has been at all times much favoured by the advocates of the antiphlogistic plan of treatment in fevers. Some practitioners have looked to purgation as only next in importance to bleeding, and the two methods of treatment have commonly gone hand in hand; there have, however, been those who regarded the clearing out of the *primæ viæ*, and the establishment of a copious drain upon the system, through this extensive channel, as the exclusive means by which fever must be eliminated from the system: the Hamiltonian method, in fact, took the place in a former day of the hydropathic system of the present; the one insisted as stoutly upon the all-sufficiency of intestinal elimination, as the other upon that through the skin. Cases will undoubtedly occur, in which purgation is the most obvious as well as necessary therapeutic indication to be followed in the first instance; but no practitioner of any experience can have failed to meet with cases in which excessive purgation has been productive of the most injurious effects. We meet with cases in which diarrhœa, tormina, flatulence, and tympanitis seem to be the result of purgatives injudiciously administered in the outset of the case. There is, in fact, no way in which cases are more commonly perverted from their natural course, and, to use a vernacular term, "spoiled," than by the injudicious use of purgatives at the commencement; while the cases in which an arrest or abortion of the fever is effected by these means are infinitely less frequent, even than those in which bleeding and emetics prove effectual.

Having passed in review the chief principal modes of treatment which have found favour in cases of synochal fever, we may now give a summary exposition of the therapeutic plan we think applicable to this class of cases.

1st. Venesection is occasionally called for; its therapeutic indication is to control the vascular excitement, which, reacting in its turn on the nervous system, tends to keep up and increase the febrile state. In these countries, synochal fever, rarely a predominant type, still more rarely calls for excessive depletory measures. One bleeding, or at most a second to the extent of about thirty ounces in all, may be taken as the limit of depletion in the synocha of these countries. In dealing with this type of fever as met with elsewhere, we must be guided by the circumstances under which it occurs, and the epidemic constitution of the time and place where it is met with. Local depletion by leeches to the head may be more boldly used.

2nd. While we do not desire to establish an excessive action of the stomach, intestinal canal, kidneys, or skin, we must bear in mind that the cure of synochal fever, as well as that of other types of pyrexial action, depends upon the complete elimination from the system of the morbid matters and effete materials resulting from the increased wear and tear of the tissues which occur in fever. We have consequently to look for, if not artificially produce, increased action of the pulmonary and intestinal surfaces and the cutaneous and renal functions. It is in this view that the use of neutral saline medicines, diaphoretics, purgatives, emetics, and occasionally diuretics forms part of a rational system of therapeutics in fevers, which recommends itself to consideration by the reasonable adaptation of the means employed to the ends to be accomplished.

3rd. The following practical rules are deduced from the observations of the older physicians; they considered that symptoms about the head, with pains in the neck, back, and down the arms, alternation of heat and cold, with giddiness, loss of sight, oppression of the chest and epigastrium, indicated gastric overloading, and called for means directed thereto. Symptoms about the loins, with pains in the small of the back, faintness and weariness in the lower limbs, alternately hot and cold feet, with distension of the belly, gripes, foul tongue, mouth bitter, hot, and fetid, indicated an overloaded state of the lower part of the alimentary tract. The former symptoms, when present in a marked degree, are a proper indication for emetics, the latter for purgatives: both, however, must be used with caution and discrimination. With regard to emetics, we have to choose from those already indicated; but our selection must not be made at random. A teaspoonful of mustard, a scruple of ipecacuanha, or a scruple of sulphate of zinc, may be employed to produce an immediate unloading of the stomach, where no further object is desired. The action of the foregoing drugs may be rendered more effective by causing the patient to drink a cupful or two of hot water. Where, however, it is desired, besides unloading the stomach, to produce an impression on the nervous system or pulse, and at the same time to act upon the skin, tartar emetic must be exhibited. From a quarter to half a grain, or in very extreme cases a grain, of tartar emetic may be given at once, dissolved in an ounce of water; free vomiting, perhaps of bilious matter, and sometimes a purgative effect, may be expected after a second or third quarter or half grain dose; we may also look for a softening of the skin and a commencement of diaphoresis, with a slight but sensible diminution of the force and frequency of the pulse. The fulness and heat of the head and throbbing of the temples, as well as the excessive action of the heart, will be diminished to some considerable degree if the drug is acting favourably. We must never forget, however, in using tartar emetic in fever, that we are dealing with a two-edged weapon; and I feel that I cannot be too cautious when speaking of its employment at all in these cases. My own opinion is, that the instances are rare in which it can be used with marked effect of a beneficial kind; on the other hand, we know that emetics in any shape often induce most troublesome gastric complications in fever.

Diaphoretics in Fever.

Sudorifics have entered largely into the treatment of fevers at all times; they are an admirable adjunct to other treatment, but are constantly much abused. Both the hot and cold bath, arrosion with cold water, and the more elaborate processes of the hydropathic system, including packing in the wet sheet, are much vaunted as agencies to promote copious transudation from the skin; but no exclusive means of treatment can be accepted by the physician well versed in the pathology of fever. With a hot and dry skin, and consequent restless excitement on the part of the patient, relief will be given perhaps most readily by acting on the skin and inducing a general moderate, and continuous sweat; but we must be careful not to disturb the equilibrium of the system, or to derange the action of the internal organs. Tartar emetic, James' powder, the antimonial powder of the Pharmacopœia; ipecacuanha, the citrate, acetate, and nitrate of potash; the spirits of nitrous ether; the liquor etheris oleosus, or Hoffman's anodyne; and, lastly, warm drinks, such as whey, gruel, barley-water, and meal tea, with a grain or two of hippo or nitre, and increased clothing, give us abundant means to choose from for inducing moderate and continuous diaphoresis. An excellent combination is that of two to four ounces of Mindererus' spirit (aqua ammoniæ acetatis), with two drachms or half an ounce of the spirits of nitrous ether, with as much water or camphor mixture as will make up an eight ounce mixture. To this may be added from one to two grains of tartar emetic, according to circumstances, and the mixture may be administered in tablespoonfuls, or ounce doses, as the symptoms seem to require. Now, what we have to keep in view is the production of a gentle, uniform, and continuous diaphoresis; we have already sufficiently exposed the fallacy of endeavouring to sweat the patient out of his fever. James' powder is undoubtedly a useful remedy for the purpose here indicated, its active principle is probably identical with tartarised antimony, and, like this latter, if used in excess, it may produce gastric irritation. The pulvis Jacobi veri may be given in doses of from one to two or three grains every second, third, or fourth hour during the day, or in a single dose it may be given the last thing at night in a somewhat larger quantity; thus we may give from four to five grains in pill or powder at bedtime, and to this may be added occasionally a grain or two of the extract of hyoscyamus. In doses above three grains the pulvis Jacobi is sometimes rejected from the stomach. An excessive drain by the skin is not at all to be desired in these cases; we must remember that there is another channel through which watery secretion is carried off, and in which it forms the medium for eliminating noxious and irritating materials, such as urea, uric acid, and various chlorides, sulphates, and phosphates, besides other ingredients. All these effete materials, which have to pass through the kidney, are increased in quantity in fever, and if the fluid requisite for their solution or suspension be drained off through other channels, as the skin, their complete elimination may not be effected, and their retention in the system may be the cause of secondary mischief. I do not feel satisfied that the excessive cutaneous sweating, and the partial or complete suppression of urine, which we observe in certain cases of fever, do not stand in some relation of cause and effect to each other. I can only say that I have seen total suppression of urine supervene in cases in which there has been excessive and continuous cutaneous action. We must not forget that there is often a very considerable drain of watery vapour from the system through the lungs in fever; thus we may note that of two cases, one being fever, and the other some apyrexial disease, lying side by side in hospital, the quickened respiratory movements of the one (a fever case) are attended by visible moisture issuing from the mouth at each expiration; while, under precisely the same conditions of temperature, the breath of the patient in the next bed does not exhibit perceptibly moisture; a glass or polished metallic surface held near the mouth will show the same effect more strikingly.

Purgatives in Fever.

We have already indicated our opinion of the mischief so often done by the abuse of purgatives at the outset of fevers. The symptoms referable to the abdomen and lower extremities, which we have already noticed, call for the use of purgatives in moderation, but it is idle to think of effecting a cure of the fever by drenching the patient with purgatives. Mild saline aperients, when judiciously employed, have a salutary and cooling effect; the sulphates of potash, soda, and magnesia, may be used for this purpose, in drachm or two drachm doses; the tartrate of potash may be employed with like effect in half drachm or drachm doses: these salts, however, will require the addition of a carminative to correct their tendency to gripe the patient. In cases where a bilious congestion is present, a mercurial purgative will be of use; the calomel bolus (five grains to the dose), or the combination of blue pill and colocynth (five grains of each), will stimulate the liver sufficiently. Drastic mercurial purgation is to be carefully avoided; it lowers the system, and is not free from the danger of producing enteric irritation or perhaps inflammation; the latter I have more than once seen.

Diuretics in Fever.

If we give a separate heading to this class of remedies, it is only for the purpose of strongly deprecating their use, unless under very rare and exceptional circumstances. If the urine be scanty at the outset, dark red, and loaded with deposit subsequently, its specific gravity being sensibly increased, and the urinous odour very strong, we know that these symptoms, instead of indicating derangement of structure or function in the kidney, prove that this part of the eliminative apparatus is doing increased duty. The neutral salts, given as before indicated, furnish sufficient stimulus, where any such is required. Deranged action of the kidney to any serious extent is of the very rarest occurrence in synochal fever. For such complications as may possibly occur, including suppression of the urine and its treatment, we refer the reader to a subsequent section, in which the subject is treated in connection with Remittent fever.

General Management of a Case of Synocha.

Thirst is a symptom often troublesome in these cases; the lips and tongue are parched, and the patient greedily swallows, if allowed, unlimited quantities of fluids. Drinks of various kinds, and fruits, are supplied as the cravings of the patient demand, and yet he drinks and sucks fruits with still unsatisfied thirst. Much mischief is often thus induced; the stomach becomes overloaded, and weakness and dilatation of this organ, with flatulent irritation, and sometimes tympanitis, with subsequent tormina, gripes, and diarrhœa, are entailed on the patient by the injudicious kindness of friends. The practical rule is to allow drink only in moderation, and that of the simplest kind; cold spring water or iced water may be allowed in small quantity, the patient being directed to retain the fluid in the mouth and fauces as long as possible. There seems to be no ground for the apprehension commonly entertained with respect to cold water, if only it be drank in moderation, and the patient be prevented from drenching his stomach with it. Effervescing mixtures, soda water, seltzer water, Carrara water, and others of the same class, may be used with good effect if given in moderation.

As a specific against the cravings of thirst, camphor mixture is lauded by some practitioners, and I have myself found it useful. It is not necessary to specify further the various drinks which the ingenuity of nurses and friends supplies to the sick-room; we must allow some scope for the officious kindness of those who minister to the wants of a sick parent, child, or friend. What we must be guided by is moderation in all things; in many cases, no doubt, it will be found necessary for us to intervene with all the authority of our art, and leave not the smallest discretion, as to the use of food, drink, or medicine, in the hands of troublesome or fussy people.

In all cases secure full control over the general arrangements of the sick-room: see that it is well ventilated, yet free from draughts; insure order, quiet, and silence, and permit no more than two persons to remain with the patient at a time.

In regard to food, bear in mind that it is not our object either to starve the patient, or, again, to give him nutriment in kind or quantity which he cannot digest. It is well, for the sake of regularity, to observe for the sick man the same *order* of his meals, and the same alternation of night and day as when he was in health. Let the food be light, mild, and well blended; if a little tea is wished for in the morning, there is no reason to withhold it; arrow-root, sago, panada, light flummery, or even jelly may be allowed between twelve and three o'clock; light drinks may be given late in the day; but, as a general rule, let the patient have no solids after sunset. There is often a decided though slight tendency to exacerbation of the symptoms at the close of the day; the pulse gets up a few beats, the skin becomes more hot and dry, and there is restless excitement, with a sense of heat and feverish oppression. This is especially the case when the patient has been worried by the well-meant but ill-timed kindness of friends, the excitement of conversation, and the strain on the nervous system, consequent on seeing and conversing with a succession of visitors. It is surprising what a state of feverish excitement, with tossing sleeplessness and miserable unrefreshing nights, will be entailed on a patient who has been allowed to pass the day (agreeably enough for the time) in the distraction of seeing a round of anxious but inconsiderate friends. "A quiet day gives a quiet night." Relapse is not infrequently caused by the injurious effects of mental exertion disproportionate to the patient's state in fever.

CHAP. V.

VARIETIES OF SYNOCHAL FEVER.

THERE is much difficulty in reducing to a common scale the various fevers recognised from time to time under the head of Synocha. Grant, one of the ablest writers of the last century, considers the febris pituitosa, the synochus non putris, the febris humoralis, the epialos, and the slow nervous fever of Huxham, to be the same disease. The synochal fever of his own day Grant describes as setting in some time in March, and lasting for a considerable period, commonly till after the summer solstice. He recognised as different varieties of this fever, the synochus simplex, which lasted only four, or at most seven days, and the febris typhodes, assodes, lyngodes, phricodes, pituitosa, and lypinea, all so called from their several characteristic symptoms. In reference to the treatment adopted by the physicians of that day, he says,—"They followed nature and assisted her;" but he cites the somewhat caustic observation of an ancient physician, who remarked, "that a new treatment often turned an old fever into a new one." Grant further makes the remark, that in 1769, till the warm weather set in, in the beginning of March, he did not hear of any slow nervous fevers; he considered the fever, of which he then saw several cases, as having the same symptoms and course as the hemitritææ and trytæophyæ of the ancients, and as the fibris hungarica, gastrica, cholerica, mesenterica, febricula, and lenta of the moderns, but as different from the bilious fever.

It is a by no means promising task, and is one which we have neither time nor inclination to follow up at present, to attempt to bring into order under one category the various forms of fever described by the older authors. Much of the labours of the older schools are devoid of practical application at our hands, to the elucidation of the nature of the several fevers of which they treat, from the absence of any strict pathological data whereby we might judge of their identity or non-identity with the corresponding forms of disease which now prevail.

We can hardly fail, however, to recognise as true to nature, even when judged by our experience of the present day, three principal groups of febrile action prominently delineated by all the great writers of past times. I allude to the classes of the inflammatory, the nervous, and the putrid fevers, which stand out in relief in the writings of the authors of the sixteenth, seventeenth, and eighteenth centuries. The first variety comprises the simple continued fevers of our own day, which occasionally still, though perhaps in all probability not as frequently as in former times, exhibit high pyrexial reaction, bounding pulse, and delirium, and other of the so-called "inflammatory" symptoms. The nervous fevers, I believe it is highly probable, comprised at all times before the development of modern pathological anatomy (and even since then, in too many instances, as I have myself reason to know,) febrile affections of essentially opposite character, and of occasionally totally different pathological nature, in which, however, there was the one common feature of nervous debility alternating with nervous excitement, but in which there was a total absence of the putrid phenomena, so called.

This group comprised the slow nervous fever of Huxham, and, in all probability, the gastric fever and the febris lenta, and all those febrile diseases to which the term synochus non-putris was applied.

As an example of the difficulty of defining fevers accurately without the aid to be derived from morbid anatomy, I may mention the instance of a case of typhoid fever which exhibited the most profound enteric lesions, and which during life, from the absence or latency of special abdominal symptoms, was regarded as an example of "nervous fever" by practitioners of no inconsiderable experience.

The putrid group of fevers of the old school comprises, of course, the true typhus, spotted, or gaol fever, or, as it is otherwise known, the maculated, petechial, Irish, and the camp or hospital fever.

Synocha, as we have defined it, will be found to comprise the majority of the ordinary *non-typhus* fever cases which present themselves to the notice of the physican in the present day. We have, it will be seen, given to the term a somewhat more large and liberal interpretation than that assigned to it in the nosology of the older schools. It will be found to include the seven-day fever on the one hand, and, on the other, those fevers which run on to the fourteenth or twenty-first day, terminating either by crisis, or by the gradual subsidence of the pyrexial action, elimination of effete materials taking place gradually through various emunctory channels. The shorter fevers terminating by crisis on the seventh day, or thereabouts, and marked by high pyrexial action, with intense heat of skin, full and bounding pulse, and often attended with much nervous and cerebral excitement, correspond to the καῦσις of the Greeks, and the inflammatory fever of the later schools. This class of fevers is not very commonly met with in the present day.

The fevers of longer duration, running on to fourteen or twenty-one days, without eruption of any kind upon the skin, and unattended by the prostration of typhus, on the one hand, or the enteric complications of typhoid on the other, constitute the simple continued fever of modern times, and the well-known "F. C. C." or febris continua communis of the official army returns.

Both the "short" and "long" fevers of this class differ in some important respects from the fevers we shall have subsequently to consider.

(*a.*) They are rarely found to be endemic or epidemic; they occur for the most part sporadically, and are due to such causes as over-exertion and fatigue, excess in food or drink, sudden exposure to excessive cold or heat, and similar agencies which affect individuals more often than masses of men.

(*b.*) Though not devoid of danger, they are not commonly fatal, and the proportion of mortality which they present on the whole is very small.

(*c.*) They seldom if ever leave a profound impression of any kind upon the system, and an attack of this kind of fever confers no immunity whatever against attacks of a similar kind, at subsequent periods of the patient's life.

Epidemics of Synocha have been recorded by some writers, but for the reasons already furnished, and in the absence of data derived from pathological anatomy, we are at a loss to know whether to accept or reject the statements transmitted to us as to the exact nature of the fever which prevailed in these invasions.

It is important to note that the synochal types of fever appear to have certainly become less frequent in these countries of late years than they must have been at one period, if we accept the accounts given us by former writers. And on this head, I for one am not prepared to go to the length of scepticism insisted on by some nosologists of the present day. We can no more argue to the rarity or non-occurrence of the inflammatory fevers in these countries in a former day, from their infrequency in modern times, than we could argue to the non-occurrence of the sweating or miliary fever, or "English sickness" as it was called, from the extreme rarity of this affection amongst our present population. And yet though the sweating fever is all but banished from these countries in our day, its existence in former times as an almost permanent endemic, and as a largely fatal epidemic, is a historic fact placed beyond all possibility of controversy.

I have myself formed the notion, but I in no way insist on it as a well-grounded hypothesis, that the sthenic or synochal types of fever are in the present day, and perhaps have always been, most remarkably developed amongst the graminivorous and herbivorous races of men, while the putrid or typhus types of febrile action more readily develope themselves in the races amongst which animal food constitutes a large part of their ordinary aliment.

The general constitution of races, and, on a smaller scale, of masses of men banded together as armies, seems in no small degree to influence the characters of the febrile affections developed amongst them even when the climatic conditions are not dissimilar. As illustrative of this class of observations, it may be mentioned, that amongst the armies engaged in the late Russian war, somewhat dissimilar types of febrile disease became developed. Thus, in the Sardinian army encamped in the Crimea, a sthenic type of fever, partaking of the characters of Synocha, was prevalent, in which the pyrexial action was so high, that the very intelligent medical officers attached to the Sardinian forces judged it necessary to bleed freely from the arm.

In the English, French, and I believe ultimately in the Russian services, putrid types of fever prevailed, in which stimulants were urgently called for, and freely employed. Amongst the Turkish troops, sweating fever, with the characteristic foul emanations from the cutaneous surface, was exhibited to a considerable extent.

Such general observations as the foregoing must not however be pushed too far. It is all but impossible to get the problem to stand on all-fours in such instances as those cited, as we have always to make allowances for differences in the age and campaigning experience and maturity of the troops furnishing the subjects of comparison, and for the effects of diet, exposure to hardships, and the length of time they have served through the campaign, which is made the means of testing their comparative pathological tendencies.

It is nevertheless highly probable that we have yet to study, as an independent branch of medical science, what we may designate as Comparative Pathology.

SYNOCHUS.

The next variety of fever we should have to consider is that known as synochus, or the mixed or nervous fever. This however is not by any means a well-defined variety of pyrexial action, and some authors refuse altogether to assign it any place in the nosological scale. It has been described as a fever commencing with the characters of synocha, and ending with those of typhus ; but this is completely to deprive it of all specific character, for a fever that terminates as typhus is to all intents and purposes typhus fever.

I am myself not by any means satisfied that we are warranted in rejecting synochus, and I believe it might be made a convenient head under which to rank the so-called "nervous fevers," and probably also the "pernicious fevers," with some other varieties of pyrexial action, the nosological position of which is as yet unsettled. But as this whole subject still rests on very debateable ground, I shall defer to another time the consideration of synochus and its varieties.

Amongst the minor types of continued fever we may notice the affections known as febricula and ephemera, and also the mild form of febrile action called into existence by the effects of the inhalation of such odorous particles as those emanating from newly mown hay, and hence designated "hay fever."

Ephemera and febricula are mild types of pyrexial action, scarcely requiring medical interference, and which run their course within twelve to twenty-four hours, but are occasionally of longer duration. The "hay fever" is often induced from the cause above assigned in persons of delicate temperament, in the early summer time. It may last two, three, or more days, and I have known it to assume the form of a Relapsing fever.

RELAPSING FEVER.

This form of fever is characterised by the occurrence of a pyrexial attack, which terminates usually by crisis more or less well marked on or about the seventh day. Subsequent to this the patient convalesces, but after an interval which is very variable, and may be extended from two or three to seven or eight days, he undergoes a second attack, which is ushered in by rigors and the usual train of pyrexial phenomena, and he is again prostrated by febrile disease, which may last for seven or eight days, to terminate as before by crisis. In some instances a second relapse takes place, and in extreme cases a fourth attack has been known to supervene.

The relapsing fever is of importance from its tendency to epidemic invasion. Epidemics of this form of fever are recorded during the last century, and since 1817 it has been known to occur on several occasions in Ireland and Scotland, as an epidemic visitation of considerable magnitude, but not of an extensively fatal character. In England this affection is less common. On the continent of Europe and in America, it is a disease not extensively met with.

While I admit the frequent occurrence of relapsing fever in Ireland, I must be allowed to record here my protest against the statements recently circulated on very insufficient data, that relapsing fever constituted the large majority of the cases of the famine fevers of Ireland. The contrary of this I believe to be the case; and having had large and extended experience in the last great famine fever visitations of Ireland in 1846, 1847, 1848, I can certify that the maculated typhus was the disease which chiefly prevailed; while the relapsing fever presented itself only at the close of the great typhus visitation. To cite no other proof: we may note that the deaths from fever in Ireland in the ten-year period, 1841—1851, amounted, as already stated, to over 200,000, a mortality which it is impossible to account for on the supposition that the prevailing epidemic was one of relapsing fever, which is certainly by no means a very formidable or fatal disease.

Amongst the premonitory symptoms of relapsing fever, we may mention nausea, pains in the back and limbs, severe head-ache, and not unfrequently greenish or yellowish bilious vomiting. Pyrexial action is speedily developed, and reaches a high degree of tension; the pulse is frequent—120 to 130 or upwards, and occasionally bounding; the throbbing in the temples is a source of much suffering; and the gastric symptoms are often severe; the urine is high coloured and scanty. There is also much tendency to engorgements of the liver and spleen. Jaundice to a slight extent is an occasional, but not constant symptom. The diagnosis of this fever is not easily made during the primary attack in isolated cases. In periods when the affection prevails epidemically, the suddenness of the invasion and the rapidity with which the febrile symptoms reach a height, with the persistent character of the gastric symptoms, and greenish or yellowish vomiting, will readily lead us to form a correct opinion as to the nature of the case before us. These symptoms are however not always of so well-defined a character.

The character and duration of the first relapse, and of the second relapse when such occurs, are not strictly determined by those of the first attack. In many instances the fever of relapse is of a much graver character than the primary disease, and occasionally death occurs in this period, a collapsed and algid condition supervening in an unexpected manner, and sometimes with great suddenness.

Convulsions prove fatal in certain cases of relapsing fever. Delirium has been known to occur during convalescence in a very sudden manner; but from my own experience of the disease in this country (Ireland) and in the east, I am disposed ro regard these occurrences as of great rarity.

During convalescence from relapsing fever, a singular cardiac murmur has been noticed.* It was a soft systolic sound, propagated up the aorta, heard loudest in the recumbent position, in most instances becoming all but imperceptible when the patient assumed the erect posture, finally disappearing as convalescence progressed, and manifestly not of organic nature.

The following observations, based on researches conducted in the Crimea, are of interest, as showing the occasional connection of relapsing fever with the typhoid types of disease.

During the summer months of 1855, this form of disease was pretty common amongst the British troops in the Crimea. The primary attack commenced with or without diarrhœa, often with pretty sharp symptoms, so that by the second or third day the febrile state was very well established. Headache was very general, and often severe; the pulse was full and quick, and 'calor mordax' of the skin was constant. The tongue was loaded, some gastric irritation and also diarrhœa were often present through the course of the disease.

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* Observations of Drs. Heslop and Lyons in the Meath Hospital, Dublin, 1847–8.

Sometimes, so early as the fifth or sixth day, these symptoms had entirely subsided, a more or less perfect crisis, usually by sweating, taking place. The patient felt well, was soon able to get up, and in a few days convalescence was apparently complete; so much so, in some instances, that the men returned to duty, often at their own request. But, after a variable period, a new invasion of febrile symptoms took place, occasionally with increased severity. The patient again sought admission into hospital, and soon presented a much more fully developed febrile state than in the first attack.

Two, three, four, or more days, sometimes a much longer period, intervened between the first and second attacks. No definite period of intermission was, however, observed. In some cases the patients had convalesced for but a day or two, when the second attack began to show itself. In others, as I have said, the intermission was such that they were able to return to their duty. It did not appear that there was anything definite as to the *times* of occurrence of remission and relapse, and we always failed to notice anything that would warrant the idea of actual *periodicity* throughout the course of these fevers.

The type of fever which was established in the relapse varied very much in different cases, and there did not seem to be any constancy, either in the characters or in the duration of this second fever.

In general the fever of relapse assumed a sufficiently grave type. Pyrexia, expressed by more or less nervous excitement, high pulse, hot skin, loaded tongue, and often diarrhœa, became well established; and in some instances the disease lasted for a full period of twenty-one days; in rare cases still longer. I have, however, known very many cases in which the second fever was of a slight character and of brief duration, terminating in from seven to ten days; but the febrile state never seemed to be thus completely thrown off, and in cases of this kind we have seen a third, and even a fourth relapse.

Perhaps the most remarkable feature of this class of fevers was the almost total absence of any constant or very definite characters. Neither in the pyrexial phenomena, the duration, or the modes of termination of the first attack, was there anything of a very fixed nature. The short primary attack not infrequently terminated with a pretty well-marked crisis by sweating. But in the secondary attacks it was exceptional to find any approach to a definite crisis of any kind. The period of intermission was inconstant, varying from two to many days. The characters of the second, or, when it occurred, of the third attack had, in many instances, no necessary relation or similarity whatever to those of the first. In many instances, they differed most widely, so much so that it seems fair to assume that, in some cases at least, the first disease stood only in the relation of an accidental, not a cognate antecedent to the second.

It will be well to observe here, that during a period embracing the months of July and August (1855), it was a very common character of the fevers which prevailed, that in the great majority of instances, a patient, instead of being attacked with one defined fever, progressing in a uniform way from its invasion to its final issue, exhibited usually one short first febrile state, from which he convalesced more or less completely, but was soon again the victim of a second, perhaps graver attack.

Within the period here assigned, this mode of invasion of febrile disease was the general one; before and after it, unity of attack was the rule.

Of the fever occurring within this order of association, be it accidental or otherwise, within the time above specified, I have known both the typhus and typhoid types to have been well exemplified. In some fatal cases, the characteristic enteric lesions of the typhoid fever were seen to be fully developed. In a clinical point of view, as a possible antecedent to fatal forms of disease, this relation of the short primary fever deserves to be borne in mind.

As to the other clinical characters of the Relapsing variety of fevers just noted, they differed in no important respect from those elsewhere presented in similar forms of disease. No fatal cases came under our observation in the Crimea.

Treatment of Relapsing Fever.

In the primary attack, when the pyrexial excitement is high, depletory measures may be occasionally called for; but we must bear in mind that the patient has in all probability more than one febrile attack to go through, and we must husband his strength. This precaution is especially necessary when, from the epidemic constitution of the time or of the class of patients we have to deal with, there is any reason to anticipate the possibility of the relapse fever assuming either a typhous or a typhoid type. If constipation be present in the first attack, a moderate use of mild purgatives is indicated; and when biliary engorgement is present, the mercurial bolus or blue pill and colocynth will be employed with good effect.

In those cases in which the head symptoms preponderate, leeches to the temples and cold lotions, or, in extreme cases, shaving the head and the application of the ice-cap will be beneficial.

When gastric derangement with excessive bilious vomiting occurs, we may suspect that the primary seat of mischief is in the liver. Our views in this respect will be confirmed if we find that there are heat, dull pain on pressure, and an enlarged circle of hepatic dulness. Cupping or leeching over the liver will be useful in such instances at the outset, and subsequently we may employ counter-irritation in the same situation. Epigastric pain, heat, and tenderness, will be relieved by the application of a blister or a mustard poultice; while the internal use of iced drinks, hydrocyanic acid, and occasionally morphia in small doses, will often be found serviceable.

It will not be necessary to dilate more fully on those principles of treatment applicable to the management of the ordinary pyrexial symptoms of the relapsing fever, and which are common to it and the synochal types of febrile disease. These we have already discussed at sufficient length.

In the interval which elapses between the primary febrile attack and the relapse, and during which, (so fallacious are the symptoms of convalescence,) the patient often appears to be steadily progressing to the complete recovery of his health, the utmost caution is requisite on the part of the physician.

The patient should be warned against all excess in food, drink, or exercise, and in the case of bodies of men in the public service, the patients should not be allowed to return to active duty till after the lapse of an interval sufficiently long to embrace the period of relapse, if such is about to take place.

The constitution of patients who have undergone relapsing fever, with the two or three successive attacks of febrile disease which it entails, is often much impaired for the time. There is general relaxation with muscular weakness, loss of tone in the vessels, a worn and sallow appearance, and occasionally a tendency to slight anasarcous swellings in the extremities. It is also possible that in this low state of the system latent dyscrasic types of disease may be called into activity, as in the instance of individuals predisposed to the tuberculous diathesis.

A course of tonics and chalybeates, a generous diet, and a liberal but not excessive use of wine, with change of air and scene, are the means which most readily enable the constitution to rally from this state of temporary depression. If not assisted by such means, there is danger that the patients may sink from lingering disease.

CHAP. VI.

TYPHOUS FEVERS.

THE term Typhous is derived from the Greek word τύφος, stupor, and has been used to designate a class of fevers in which a low prostrate condition of the system is present, marked especially by a torpid state of the intellectual faculties, and of the nervous energies in general. Under this head are comprised various fevers, known to authors as putrid and malignant fevers, the jail and camp fevers, the *febris bellica*, and the spotted or petechial, maculated or Irish typhus fever, as well as the typhoid or enteric fever, or, as it is now sometimes called, the pythogenic fever.

Fevers of the typhous type present themselves sporadically, endemically, and epidemically.

The first epidemics of typhus of which we have reliable accounts are those which occurred in Italy at the commencement of the sixteenth century, and which were described by Fracastor of Verona.

The geographical limits of true typhus may be stated to be, in Europe, from 40° to 60° N. lat., and on the American continent between 30° and 50° N. lat.; it is said to exist in no place where the mean annual temperature rises above 62° Fahr. or falls below 40°. Dr. Morehead asserts that typhus is unknown in India; and Dr. Alex. Webb is the only author, so far as I am aware, who has recorded its occurrence in the Indian empire; he notices two cases as having occurred at Simlah.

But it is within the European and American limits above assigned that typhus is found to occur as a really formidable scourge of the human race. Some idea of the extent to which it prevails may be formed from the results obtained by the Census Commissioners of Ireland, which show that in the ten-year period between 1841 and 1851, over 200,000 deaths took place from fever, and of those deaths the greater number were undoubtedly due to the spotted or petechial typhus.

All the fevers met with in the typhus category present certain striking features in common, namely, early prostration if not collapse of the system, a peculiar dusky appearance of the skin, a semi-livid state of the countenance, a dull, stupid, and torpid condition of the intellectual and general nervous energies; the patient being in a state of semi-consciousness, from which, however, he is easily roused, answers questions coherently, but relapses immediately into a state of apparent torpor and unconsciousness. The vascular reaction is generally feeble, and in extreme cases there is a tendency to death and gangrene in the peripheral parts, from failure of the circulation.

The combination of symptoms we have here described will be found to characterise certain diseased states, which differ much in essential details and in their duration and course, and the particular organs implicated by them. It may be advantageous to employ a term which would comprehend the several diseased processes here alluded to; and the term *Typhosis* may be introduced to embrace the very well-marked groups of morbid phenomena above described.

The following morbid states may be recognised under the common head of "Typhosis."

TYPHOSIS.

Various Forms of.

I. The typhus fever proper, which comprises the spotted, petechial, malignant, and gaol or camp fever, and the Irish typhus, *par excellence.*

II. The typhoid or enteric fever, or dothionenterite, otherwise known as the pythogenic, and sometimes as the French or Continental fever.

III. A state of the system in which, independently of the before-mentioned essential fevers, the pyrexial action which attends local diseases, such as bronchitis, pneumonia, and occasionally hepatitis, assumes all the characteristics of the low typhoid condition, with tendency to early sinking, collapse, and fatal issue.

IV. A state which supervenes upon cholera, and which presents a pyrexial reaction, having marked typhoid characters of the kind above detailed.

V. A condition of the system which follows upon severe injuries, wounds, or surgical operations, and upon such diseased processes as erysipelas, phlebitis, and purulent absorption. This is the state so often preluding a fatal issue, which is implied when we hear it said that the patient has sunk into a low typhoid condition.

It would be an interesting question in speculative pathology to investigate the mutual relations, and probably common nature, of several of the great morbid processes just enumerated, but such inquiries are beyond our present limits. It is remarkable that, while two of them at least present the features of independent, essential fevers, the pyrexial reaction in the other three states seems to take its origin from localised disease in the first instance.

It is not our intention here to enter at length into the vexed question of the identity or non-identity of the typhus and typhoid fevers, so called. We shall recognise a practical, clinical difference in the course, duration, symptoms, and secondary lesions of the two morbid processes. It is indeed not improbable, that while they are to be regarded as branches of the same stock, they recognise a different exciting cause. The natural history of the two diseases differs likewise in many essential respects. The spotted typhus, for instance, it is well known, is historically associated, in Ireland and elsewhere, with great famine periods, and a depressed and impoverished state of the population. The typhoid or enteric fever, on the other hand, is not largely called into existence by these agencies; but it has been shown to be connected with such causes as imperfect ventilation, impure water supply, bad sewerage, and the foul emanations of animal and vegetable refuse and human ordure.

The Typhus or spotted fever presents the following clinical characters. The invasion of the disease is generally insidious, though we meet with occasional instances of sudden accession of the symptoms of prostration, if not collapse. There is rarely any period of well-marked incubation; the rigors, pains in the head and back, and lassitude of the extremities, with failure of the nervous and muscular energies, come on insidiously, and the patient has no idea of the gravity of the disease which threatens him, and struggles on against it with a vain effort to shake it off. It constantly happens, in cases amongst the lower classes of society in Ireland, that a patient struggles on against the depressing influences of the disease for days together, and pursues his ordinary avocations as best he can; in the end he finds himself overcome by the influence of his malady, and seeks advice at the nearest hospital or dispensary. The experienced eye of the physician detects at a glance that the fell typhus is upon the victim; he is admitted into hospital, and in twelve hours it would be almost impossible to recognise in the collapsed, torpid, and semi-conscious patient lying prostrate before us, the man who, through failing strength, had desisted from active bodily labour but half a day previously. We have in this class of cases a remarkable evidence of the moral influence exercised upon disease, under the pressure of necessity, which drives the patient to the exertion of almost the last muscular effort which is left him. When the necessity for exertion has passed, the patient succumbs rapidly and profoundly under the depressing typhus influences; this is a fact which must be familiar to all Irish practitioners, and is one which is not without an important and practical bearing on the ultimate course of such cases. Thus we find that patients who, in the weakened state of their system induced by the early stages of typhus, largely expend nervous and muscular force, have to pay the penalty ultimately, by undergoing very low and prostrating forms of the disease. Great sinking and tendency to early fatal issue ensue in many of these cases. The practical indication furnished by such observations is, that in all cases of suspected typhus, we should take the utmost care to husband the patient's strength from the outset. For these, and other if possible more urgent reasons, it is highly desirable that, in a suspected case of typhus, we shall be able to make our diagnosis at as early a period as possible. And yet, no class of case will progress for so many days, without its presenting a single sign by which it would be possible to predicate that the disease is absolutely typhus, or about to be such; till, in fact, the appearance of the characteristic eruption, which it is no uncommon thing to find delayed until the seventh or eighth day, we are not in a position to state upon perfectly positive evidence that the case is one of typhus. How much of mischief, and how much of ultimate peril to the safety of our patient, may not be entailed by the measures adopted by the physician within this period? Seven days are a long period to wait expectant by the bedside of disease, uncertain what counsel to hold, what measures to use, what prognostics to indulge. Seven days seem a long period to wait in inaction, when no clear course is open to us. In seven days, many a form of fever will be brought to a final and favourable issue. And yet, in typhus fever it will often require seven days of marching and counter-marching before we know what the enemy is which we have to encounter, and before we know the ground upon which we have to give him battle. In these seven days, what patience, skill, fortitude and moral courage are not requisite on the part of the physician, to enable him to refrain from meddlesome and injurious interference with his case, pressed as he is from within, by a sense of responsibility, and from without, by the anxious expectations and often urgent solicitude of friends, who think that it is a doctor's business to be always doing something for the patients under his charge—now bleeding, now sweating, now purging, and anon counter-irritating, with a perpetual recurrence of pills, potions, and external applications, and a never-ending round of drinks, medicines, stimulants, and such like measures!

It might be said without exaggeration, that more cases of typhus are lost and won by what is done or left undone within the first seven days, than by almost anything which may subsequently happen in the progress of the disease.

Though devoid of characters of an absolutely specific kind until the lapse of the first five or seven days, typhus fever commonly presents, after the first twenty-four or forty-eight hours, a marked physiognomy, and certain general features, by which the well-experienced eye may be safely guided to a diagnosis in the great majority of instances.

We shall now take up the consideration of those general features which characterise a case of typhus fever.

General Physiognomy of Typhus Fever.

We may group the phenomena presented under this head in the following order:—

(*a.*) A state of general prostration of the patient is noticeable from the outset; it is not uncommon to find this developed so early as the third or fourth day. And when a patient bears up against the impression of the disease to the fifth, sixth, or seventh day, prostration supervenes in the end, with a suddenness and completeness for which we find no parallel in any other form of disease. This is the case in those instances in which a patient, having toiled on at manual labour till suppose the fifth day, is able to walk to hospital, and to give some account of his symptoms, and yet is in twelve hours subsequently in a state of the most profound typhoid collapse, as already explained. If we compare for an instant the features of a case of synochal fever and one of typhus, we shall be struck with the following points of contrast. In the one (that of synocha), the patient presents great vascular excitement, flushed face, a lustrous and perhaps fierce-looking expression of the eyes, great restlessness, much heat of skin, strong and perhaps bounding pulse, and a state of the system which may be generally expressed as being much above par. In typhus, on the contrary, the prostration we are describing, and the other symptoms about to be noticed, are commonly well shown by the fifth or sixth day.

(*b.*) A flaccid state of the limbs, with great muscular debility, and dorsal decubitus, are, when early developed, very characteristic of typhus.

The way in which the patient lies in bed in typhus is peculiar; the head is low, and the patient's body slips down in the bed, till the limbs, trunk and head, by the force of gravity, are nearly horizontal.

(*c.*) A peculiar state of semi-consciousness is early developed in typhus; the patient lies listlessly on his back, taking no heed of what is passing around him; the eyes are half closed, or, if open, have a glazed, dull, and vacant expression. However, if shaken, spoken to loudly, or otherwise roused, it is often found that the faculties are still perfect; when questioned, he answers coherently, and the intellect is found clear and the memory undisturbed. He relapses immediately into the same unconscious state, when we cease to attract his attention or to question him.

The passive state here described is in marked contrast with that found in the synochal fevers, though, of course, typhus presents occasionally complications, with delirium, muttering, restlessness, and other symptoms which indicate vascular and nervous excitement.

(*d.*) Typhus cases exhibit a peculiar dusky, somewhat bluish, and rather dirty-looking appearance of the entire cutaneous surface; this discoloration, of a bluish or somewhat livid tint, is due partly to a sort of venous stagnation in the capillaries of the skin, and partly to an impure and ill-aërated state of the blood.

(*e.*) The appearance of the face is highly characteristic, and often of itself announces the disease the patient is labouring under. It partakes of the general dusky tint of the rest of the surface, but there is a peculiar reddish brown upon the cheeks at the malar prominences. The eye is very peculiar, though its characters vary a good deal; it is suffused, half open, the conjunctiva slightly congested and moist at first, though afterwards dry. The gaze is fixed, dull, and vacant; on the other hand, we may have the eye dry, hot, and bloodshot, the pupil contracted, the expression wild and furtive, less commonly fierce; to this character of the eye is given the name of "ferretty."

The mouth is commonly half open, the lips dry and chapped, and dark-coloured matter collects upon them and upon the teeth and tongue, which is known as *sordes*. The odour of the breath and the smell of the patient's person are quite peculiar in many cases of typhus. It is not to be expected that all these symptoms will be found fully developed by the fifth or sixth day; but it is very uncommon to find a case which is about to be one of typhus fever, pass the fifth day without presenting some, if not all, of the foregoing symptoms grouped together in such a manner as to strike the eye of a physician who has had the least experience in this class of diseases.

A kind of algid condition, with coldness and lividity of the extremities, which we find developed in many instances, shows a tendency to failure of the peripheral circulation, which in extreme cases ends at a subsequent period by producing gangrene of the toes, feet, or legs, besides minor points of mortification in parts subjected to pressure.

We will now suppose a case of typhus fever, progressing in the usual way, and not unfavourably, before the development of absolutely characteristic signs. The patient is lying in a state of low, half-dreaming consciousness, making no complaint, and seeming to have no suffering whatever; there is no local disease in the head, chest, or abdomen, and apparently no symptoms to call for medical interference in any shape; and yet even thus early, as we shall subsequently better understand, this is precisely the time when acts of omission or commission by the physician may tell much, if not decisively, for or against the ultimate issue of the case.

Eruptions in Typhus.—Between the fifth and the seventh day, the characteristic eruptions of typhus fever begin to make their appearance; they may be visible a day earlier, that is, on the fourth day of the disease, or their appearance may be deferred till the eighth; exceptional cases will also no doubt occur, in which it is difficult, if not impossible, to say that an eruption is present at any period of the disease. The general rule, however, is, that the eruption in typhus is first visible at some time between the fifth and the seventh day.

Maculæ and Petechiæ.—At this period the spots known as "maculæ," and sometimes "petechiæ," develop themselves on various parts of the body; they are often visible first on the chest and abdomen in females; in males they are more common at the outset on the back, and especially in the interscapular region. From these parts they gradually spread to the remainder of the trunk, to the neck and face, to the upper extremities, and to the thighs. It is unusual to find them upon the hands, and the legs and feet; but a full crop of them is sometimes well developed in the last-named situation. It is not easy to reconcile the different descriptions given to us by authors of the spots known as maculæ and those known as petechiæ. For my own part, I recognise but one eruption of the kind now immediately under consideration, and I think that they may be called indifferently either maculæ or petechiæ.

The following are the essential characters of the maculæ of typhus; they are commonly from half a line to a line in diameter, of a dusky brownish-red tint, and very slightly raised above the surface of the skin; they disappear upon pressure, but reappear immediately when the pressure is removed. They vary in quantity, being sometimes so closely set that a square inch will contain a dozen or more of them. In certain cases we find them of unusually large size, and then, as might be expected, they are not so numerous. The general eruption remains out upon the skin from five to seven days, but within this period there may be two and perhaps more successive crops of spots.

Much may be learned from an attentive consideration of the spots in fever; if of a vivid tint, raised above the skin, rapidly reappearing after surface for a day, or at most two days, then burst, discharge their contents, and leave behind a slight superficial cuticular efflorescence. The eruption of sudamina is not constant in typhus, and has but little practical import in the case, unless the fluid in the vesicles be turbid, or sanguinolent, the sweat secretion presenting at the same time a foul and fœtid odour. In such a case, these phenomena must be interpreted as the result of the general putrescence of the fluids. Generally, as above stated, the occurrence of sudamina is without practical bearing on the case. It is needless to say, after the full expression of our views with respect to crisis contained in this work, that no abortion of the fever is to be expected from the occurrence of sudamina.

Purpuric spots.—An eruption of purple spots and occasionally of purple patches is commonly enough found associated with the maculæ of typhus in certain epidemics. The nature of these purpuric spots seems identical with that of the spots which occur in true purpura hæmorrhagica; they are irregular in shape, and vary in size from a sixteenth of an inch to one or two lines or upwards. They are permanent stains, of a deep purplish or blackish-blue tint, and *do not disappear on pressure*, whereby they are at once distinguished from true maculæ of typhus, or the rose-coloured lenticular spots of typhoid. In the low epidemics of Ireland, the purpuric spots become developed at an early period of the fever, and are persistent throughout; they are sometimes present in extraordinary abundance, thickly strewn upon the face, neck, trunk, upper and lower extremities, and upon the anterior, as well as the posterior surface. It is not uncommon to find them thickly covering the legs and feet, and giving a peculiar aspect to these parts. Large purple patches, not disappearing upon pressure, and in no way distinguishable from those of true purpura hæmorrhagica, are present in some instances upon the lower extremities, and various dependent parts. These purpuric spots and patches are derived from pathological states of the blood and blood-vessels, and are to be regarded in some instances as true subcutaneous hæmorrhagic exudations; in other cases, as in a manner resulting from the staining of the tissues by imbibed blood. They are always indicative of extremely low action in the system, and are to be looked upon as symptoms of the very worst augury; our prognosis must be therefore of the most guarded kind in cases in which there is any very considerable eruption of purple spots or patches.

Vibices.—This term has been applied to certain irregular black and blue patches, occurring on various parts of the surface; they sometimes present themselves as longitudinal streaks, similar to those which follow blows of a stick. They appear suddenly, last for some days, and gradually fade, passing through various shades of colour, to a light lemon yellow tint, after which they soon vanish. Vibices seem to be essentially of the same nature as the purpuric spots and patches just spoken of; but in a practical point of view, they have this essential difference: vibices are less numerous, they are also not unfrequently isolated, and confined to one or two particular spots, and the cases presenting them have seldom, if ever, such a tendency to low sinking action as those with the purpuric complication. Patches of more extensive subcutaneous hæmorrhage occasionally present themselves; thus we find the greater part of the calf, and it may be of the lateral and anterior surfaces of one or both legs, the seat of a uniform, bluish-black discoloration, which is persistent and not altered by pressure; the dorsum of the foot, the back of the hand, and various parts of the trunk, both anteriorly and posteriorly, may be the seat of similar discoloration. These extensive patches are likewise, no doubt, to be referred to a condition similar to that of purpura hæmorrhagica. I have no observations to prove the occurrence of spots of this kind on the internal mucous surfaces, but from analogy I think they must be often present in this condition, as we know them so commonly to be in true purpura, in which we often find them on the intestinal as well as on the peritoneal and other serous surfaces. Care must be taken not to confound the foregoing appearances with those found in parts undergoing mortification, which likewise is an accident to be anticipated in bad forms of typhus.

Erythematous patches.—Spots, varying in size from half an inch to a hand's breadth and upwards, will be noticed in various parts of the body to present a reddish tint, disappearing on pressure; there may be a slight elevation of the skin, with a tendency to efflorescence of the cuticle. When presented on the anterior surface, these erythematous patches are of little significance; but when they show themselves upon the posterior aspect of the body, and especially on parts subjected to pressure, they demand our most immediate attention, as they are often the precursors of rapid and deep inflammation ending in death of the part. The integument about the occipital protuberance, that of the nape of the neck, that over the vertebra prominens or seventh cervical, the angles of the scapulæ, the elbows, the back of the sacrum, the buttocks, the calves of the legs, and the thick adipose covering of the heels, are all liable to this erythematous inflammation, tending to end rapidly in mortification.

The affection known as lentigo, or freckles, tends sometimes to obscure the appearances of the surface in typhus cases; freckles are to be recognised by their yellowish aspect, their non-disappearance on pressure, and the fact that they are present only on parts exposed to the sun. Flea-bites, likewise, often complicate the appearances in fever cases; it is surprising in what numbers they will be present in patients from amongst the poorer classes, in whom squalid poverty offers little inducement and no facilities for the cultivation of personal and domestic cleanliness. Flea-bites, when recent, exhibit circular spots half a line in diameter, of a rose-pink colour, disappearing on pressure, and exhibiting a minute central point; by these characters they can be readily known.

Individually followed up in the way we have attempted to describe them, the various eruptions occurring in typhus can be distinguished and identified without much difficulty; but the student and junior practitioner will often find it a puzzling task to unravel the various complicated appearances presented in a suspected case of typhus, and to say whether there be or be not an eruption of true maculæ or petechiæ, which would enable him to form a positive diagnosis as to the nature of the case before him. A case on the seventh or eighth day of typhus, with an abundant crop of maculæ, purpuric spots and patches, vibices, freckles, and flea-bites, often requires no small experience and careful study of its phenomena before a diagnosis can be positively affirmed.

The appearances of the skin are not less important in regard to prognosis; they will often aid us in forming a reliable opinion as to the course a case is likely to take. In general it may be said that cases of typhus with dusky and much congested skin, tendency to coldness in the extremities, and exhibiting copious, complicated, and livid eruptions, sink early, and are very fatal. On the other hand, where the cutaneous circulation is well maintained, and the eruptions single, not too thickly strewn, and of a florid tint, the patients do well, unless there be serious internal complications.

State of the Tongue.

Most valuable indications may be obtained in typhus, from carefully observing the condition of the mouth and tongue. When the pyrexial state is first developed, the tongue is often soft and creamy; as the case goes on, the secretions about the lips, teeth, and internal portions of the mouth accumulate, owing to the suspension of the finer sensibilities of the parts, and the arrest of those minor involuntary movements, hardly noticeable in the time of health, but which, by the constant action of the lips and tongue, keep the parts clear of epithelial *débris*, saliva, &c. If we watch attentively the face of a person in typhus, we may remark, besides the symptoms already noticed, much insensibility to external impressions; thus the patient will sometimes take no heed of the fly that crawls over the eyelids, upon the nose, or it may be in and out of the mouth. The eyelids and lips are but seldom moved, and then but sluggishly and imperfectly; he breathes by the mouth as much as by the nose. As the result of this, epithelial debris, saliva, and the tartar of the teeth accumulate, and crust upon the lips, gums, and tongue. They become blackened and decomposed, and emit an impure odour. The secretion on the tongue undergoes similar changes; the term *sordes* (filth) is applied to the foul encrusted secretion upon the lips, teeth, and tongue; it sometimes accumulates in considerable masses, and requires to be removed.

After the creamy state of the tongue, we next find this organ presenting a still moist, but thick and dirty, brownish coat. In some cases the tongue is thickly coated with sordes, but is still moist and of its natural volume, or slightly marked on the sides with the impressions of the teeth, showing that it is a little enlarged. A state of the tongue is not unfrequently met with in which it is dry and cracked, contracted in volume, and pointed; there is but little coating upon it, and the condition of the organ reminds us of that presented by the parrot's tongue, and hence this condition of the tongue in fever has been designated by the French as *la langue perroquet*, or parrot's tongue, an expression which conveys a very good idea of the state of the organ. The hard, dry, brown, mahogany state of the tongue, is another condition of the organ which requires particular notice: the tongue is thickly crusted with dry sordes; it is sometimes fissured, and occasionally exudes blood; the colour is peculiar, and is well conveyed by the term mahogany. This state of the tongue is of great practical importance as an indication for treatment: cases exhibiting this condition of the organ will often be found to require the liberal use of stimulants, and to bear them well. The last condition of the tongue which requires notice, is that in which we find the organ in a weakened and semi-paralytic state. It is tremulous, and the patient protrudes it with difficulty, and uncertain motion, as if he had almost lost control over it. This tremulous and semi-paralytic tongue may be either moist, and of natural volume, or coated, dry, and fissured; as far as a single symptom goes, it is one of very bad omen, and indicates a very low state of the system.

Attention to the characters presented by the tongue as above detailed will give us most valuable hints in the course of fever, but we must always remember that the indications derived from any one organ are only to be correctly interpreted by taking them in connection with those furnished by other parts of the system.

We are now in a position to take a view of the more important phenomena presented to view by a well developed case of low typhus, about the eighth or ninth day of the disease. We will suppose the patient to exhibit the characteristic typhus prostration in a well-marked degree, the skin being profusely maculated, and spots of *purpura hæmorrhagica* developed upon the lower extremities and elsewhere upon the surface, with two or more purpuric patches, or vibices, disseminated here and there. (The purpuric appearances are of course not developed except in very low states of the system.)

The patient lies in a half-conscious state, perhaps occasionally muttering, but making no complaint, and suffering little; he is easily roused, answers coherently, but relapses immediately into his dreamy, half-conscious state. The pulse is quick, 120 to 130; it is weak and devoid of resiliency, but may have some volume. It is, however, readily extinguishable by slight pressure in most cases of the kind now under consideration. The patient is in all respects in a passive state, takes food, drink, and medicines when offered to him, and makes no resistance when any ordinary offices are performed for him by his friends or attendants. If carefully observed, it will be found that many patients in this state, though quiet and almost unconscious by day and night, get little or no continuous sleep; they dose for a short time, but there is no unbroken or refreshing sleep. Without actual delirium, there is occasionally much rambling, and the patient is often subject to various hallucinations and illusions, which, however, are dispelled when he is roused, called by name, or otherwise forcibly addressed. In the condition here but imperfectly described, many patients will go on from day to day, without the supervention of any new symptoms, and without anything that will alarm the friends, or the physician inexperienced in the pathology of typhus. It will be soon manifest, however, that the patient is losing ground, he is becoming weaker and weaker from day to day; he is sinking slowly, imperceptibly, but surely; at last the vital powers become exhausted, and he dies out on the 13th or 14th day. "He goes out like the snuff of a candle," as it is forcibly and characteristically expressed. This is the history of no inconsiderable number of fatal cases of typhus fever in all epidemics; these are cases of a very treacherous nature, and for which nothing but a large experience of the disease will prepare us. There are few practitioners who have not to admit that cases of this kind have slipped through their hands, almost without their suspecting the formidable character of the disease.

In other instances, with judicious care, the liberal use of stimulants, and an early anticipation of this tendency to low sinking of the system, cases of typhus will be brought to a favourable issue at some period between the 14th and 21st days; the eruption gradually fades, the patient slowly emerges from the state of prostration, and the nervous and circulating apparatus become gradually restored to energetic and healthy action. In either of the two events just indicated the case is a true exemplification of a pure, uncomplicated, essential fever, progressing to a termination, whether by death or recovery, without a single organ or tissue in the body being implicated in any process of disease whatsoever. This, in fact, may be looked upon, so to speak, as the *normal* course of typhus fever. The system undergoes a general process of diseased action, the main features of which are extreme and intense prostration of the nervous energies, and which is attended by increased metamorphosis of the tissues throughout the body, but is wholly independent of recognisable lesion in any part or organ after death. In fatal cases of this kind we examine all the organs in vain to discover the cause of death; the brain and spinal marrow are free from disease; the lungs, except hypostatic congestion of the posterior lobes, present no pathological state; the heart is often healthy, but, as will be subsequently explained, this organ perhaps more frequently than any other presents certain changes: in the abdominal cavity, the solid and hollow viscera present no departure whatever from a condition of perfect health. *Normal Typhus, then, it is beyond all question, may run its course, and prove fatal from extreme prostration of nervous power, without the slightest lesion being discoverable in any part or organ after death.*

Pure uncomplicated typhus fever is, however, far from being commonly met with: for while pure uncomplicated typhus is to be regarded as the normal type of the disease, the cases met with in practice present a singular tendency to the development of incidental lesions affecting now this organ, now that. Thus we shall find that in one class of cases, or at one period of an epidemic invasion, head symptoms with delirium are commonly associated with the fever; in other instances it is the lungs which are specially affected; under circumstances still more rare, the intestinal mucous surface may be the seat of secondary lesion. We find then, on the one hand, that it is necessary for a true conception of the nature of this fever to consider it as an essential disease of the whole system, not originating in special lesion in any one part or organ. It is equally important, on the other hand, in our clinical consideration of typhus, to know that it is a disease which, while following out a definite course of its own, may incidentally lead to the development of various lesions, which may affect indifferently any organ in the body, but have in certain epidemics, and in certain classes of individuals, a proneness to invade certain organs to the exclusion of others.

The lesions now spoken of play, in one sense, a secondary part to that which the fever itself performs; they do not belong to the fever, they may be altogether absent without impairing its true character:

they are therefore properly designated as the secondary lesions of typhus fever.

SECONDARY LESIONS OF TYPHUS FEVER.

The Secondary Lesions of typhus fever implicate almost all organs in the body; we propose to enter on their consideration in the following order: —

1. Secondary Lesions of the Cerebral Organs.
2. Secondary Lesions of the Circulating Apparatus.
3. Secondary Lesions of the Lungs and Pleuræ.
4. Secondary Lesions of the Intestines.
5. Secondary Lesions of the Solid Viscera, including the Liver, Spleen, and Kidneys.
6. Secondary lesions of the Cutaneous System, including bed-sores, mortification of the extremities, and certain minor conditions.

We saw that it was the prominent characteristic in many cases of pure typhus, uncomplicated with local affection, that there was a disposition to sink and for the vital spark to go out, as it were, life becoming extinguished almost imperceptibly and insensibly, and without any accession of violent symptoms, and often indeed without any apparent cause at all, except the excessive weakness and utter prostration which the patient's system undergoes. This is not uncommon in the typhus of the upper and middle classes, but it is far more usual to find that the case presents, and this from an early period, some one or more of the local affections in the various organs just enumerated, as the head, lungs and heart, and abdominal organs.

What, it may be asked, is the nature of these local affections? They are not part of the fever, they have no necessary connexion with it, for we have seen that pure typhus may go on to the end, and issue in death or recovery, without them. They are not inflammations in the strict sense of the term, and yet we have no other pathological condition under which to range them.

These secondary lesions of typhus present many features in common amongst themselves, and by which they are well distinguished from ordinary inflammations.

(*a.*) They are marked by the suddenness of their invasion, and the absence of premonitory symptoms.

(*b.*) They present an abnormal course, and not unfrequently a suppression of one or more of the stages which similar processes of disease exhibit in the healthy organism; in other words, the secondary lesions of typhus have a kind of abortion of their first stage, and the organs which they attack are suddenly precipitated into an advanced condition of disease.

(*c.*) The secondary lesions of typhus often present abnormal characters in their signs and symptoms: they likewise are but little under the influence of depletion and other antiphlogistic measures, while stimulant treatment has a singularly favourable influence upon them.

(*d.*) They are characterised by a common tendency to rapidly fatal issue, and in post-mortem examination it is not unusual to find that the anatomical lesion is wholly disproportionate in extent to the exaggerated symptoms present during life.

HEAD SYMPTOMS AND CEREBRAL COMPLICATIONS IN TYPHUS.

Head symptoms of a very formidable class not unfrequently present themselves in certain cases of typhus. It is a very important observation, and one well borne out by the experience of practical men, that head symptoms are more often met with, and are more often fatal, in the upper than in the lower classes of society. Few of the physicians who fought the good fight against disease in any of the great epidemics of these countries, especially in Ireland, can fail to recognise the truth of this observation. In periods of great epidemic visitations, the typhus attacks all classes of society indiscriminately, respecting neither age nor sex, and invading the mansions of the rich as well as the squalid hovels of the poor; but its death-blows seemed to be dealt with a discriminating hand.

Thus we find that typhus proves fatal by cerebral complications, in the better classes of society, as constantly as by thoracic secondary lesions amongst the lower classes. It may be that those organs which are in the highest state of physiological activity in the condition of health, are the most prone to disease, and that, as the cerebral organs are more exercised amongst the better classes, they are more readily seized upon by the typhous influence when it pervades the system. Certain it is, that amongst the many gifted and noble-minded individuals who have fallen victims from time to time to the typhus of this country (Ireland), the cerebral symptoms in the majority of instances have been those which ushered in the fatal termination.

The slightest form of cerebral and nervous excitement which we meet with in typhus, is that in which there is constant low muttering delirium, but the patient lies tranquilly in bed, and will answer coherently if strongly roused. In this state the patient may pass days in succession, getting some occasional hours of quiet and refreshing sleep: such cases are not very formidable. The next variety of case is that in which we have sleeplessness superadded to the delirium: under these circumstances, the patient becomes restless, irritable and excited, and the delirium assumes the character of being watchful and furtive; sometimes the patient is timorous, sometimes he is disposed to be violent and uncontrollable. The eye now assumes an altered expression; it is no longer half-closed and semi-conscious, but watchful, restless, occasionally brilliant and fierce-looking, and sometimes of the kind known as "ferretty," the pupil being contracted and the conjunctiva injected. The patient is often under the influence of hallucinations and illusions, which, in a rambling way, he communicates to those around him.

It is well to indulge these impressions on the part of the patient, within certain limits, with a view to tranquillising him; but I have known instances in which a patient, with an instantaneous return of consciousness, loudly upbraided the nurse for bad faith in aiding him to deceive himself with the imaginings of his fevered brain. Cases of this kind require much skill and tact to manage them, as waste of vital energy from nervous or mental excitement is followed by great prostration, and occasionally by fatal collapse.

The next important variety of cerebral and nervous excitement in typhus, is one which closely resembles the condition of *delirium tremens;* indeed, it would be no misnomer to designate the condition we are now about to consider *the delirium tremens of typhus.* I have most often seen this condition to supervene at the end of the second week or the beginning of the third week. The patient is usually much debilitated, the pulse is feeble and quick, at or over 130; the surface is moist and clammy, and there are occasional paroxysms of sweating; the countenance is anxious, and the expression betrays fear and apprehension; the eyes are restless, furtive, and suffused. The patient is fidgety and restless, sometimes half sitting up in the bed, sometimes watching an opportunity of getting out of bed for some ill-defined purpose; but it is worthy of note, and highly characteristic of this state, that the patient is easily cowed by a gesture of command, and a firm look or word. In this respect the delirium tremens of typhus is very analogous to that of the dipsomaniac. There is often a general tremor of the limbs, and a tremulous state of the tongue. The cardiac action in these cases is often violent, but excessively feeble, and the patient is altogether in a condition of the most extreme danger; the nervous energies are in fact on the point of giving way, and in many instances the patient's life hangs literally by a thread.

We have now to notice a condition of high excitement in typhus, the symptoms of which are of even a still more urgent kind; they resemble somewhat, and are constantly taken for, those of phrenitis, and it is this class of cases which, *par excellence*, are usually regarded as examples of "brain fever" so called. There is usually an increase of the high pyrexial excitement; the skin is hot, and the face flushed; the pulse is full, strong, 120 to 130; the heart's action violent, and there is throbbing of the temples and of the vessels in the neck. Headache, general or frontal, pains in the eyeballs, intolerance of light, contraction of the pupil, brilliancy of the cornea, and congestion of the conjunctiva, are also well-marked features. The expression of the eye is bold and fierce, the delirium which supervenes is persistent; it is also of an active and threatening nature, and nothing short of physical restraint in many instances prevents the patient from doing injury to himself or others. This is the true *delirium ferox of typhus;* the patient raves constantly, and it is impossible, as in the states hitherto considered, to get coherent answers from him.

He wildly tosses about his head, trunk, and limbs; in the worst cases there is complete insomnia; and for days and nights together the patient does not get an hour's sleep. The muscular efforts of the patient are surprising, and it will often require the united strength of three or four attendants to keep him in bed; a strait-waistcoat is the safest means in such cases. Nothing can be more trying to the medical attendant than the care of a typhus patient under the circumstances which we are now but feebly endeavouring to pourtray. He can hardly leave his patient for a moment, and yet can often effect but little by his presence. Hour by hour he sees his patient expending the last remnant of his vital powers in high-strained and violent exertions of nervous and muscular force. To the state we have just described often succeeds a short interval of profound prostration and collapse of all the vital energies, and in a few hours subsequently the patient dies out, utterly exhausted, the last vital spark becoming almost insensibly extinguished. In other instances, a state of coma supervenes, with total insensibility, dilatation of the pupils, stertorous breathing, and it may be a relaxation of the sphincters. I have occasionally witnessed in association with this state of things a low moaning of a peculiar kind, and a rolling of the head from side to side, which continued for days and nights, to cease only at death.

Besides the states above described, we meet with incidental forms of nervous derangement in fever. Under this head may be classed tonic and clonic spasms, and other convulsive affections, jactitation of the limbs, and floccitatio, or involuntary picking of the bed-clothes. Paralysis of the sphincters of the rectum and neck of the bladder is often met with; involuntary motions from the bowels, and the dribbling of urine are very troublesome affections, soiling the patient's bed and person, and if constant attention is not given to the patient, irritation and excoriation of dependent parts often ensues. The state of the bladder and urinary apparatus in typhus is more fully described in a subsequent section.

The pathology of the cerebral lesions of typhus still rests on somewhat debateable ground. Of one position, however, I am myself perfectly confident — namely, that they are not true inflammations; and it is certain that if we treat them as inflammations, and by the antiphlogistic method, we shall lose a large proportion of the so-called *brain fevers.* It has been well and profoundly observed by Stokes, that those symptoms which indicate inflammation under ordinary circumstances, do not indicate inflammation when the case is one of typhus fever. We may appeal, again, to the researches of Louis for confirmation of these views in respect to the cerebral symptoms in fever. In the extensive pathological observations which I have myself made, the absence of any connection between cerebral symptoms during life, even when of an aggravated kind, and inflammatory lesions in the brain and its membranes after death, has been noted in many forms of fever. Numerous dissections warrant me in stating that I have found sensible congestion of the brain and its membranes with increased serosity in the ventricles and subarachnoid spaces in cases which had presented no cerebral symptoms whatever during life; and again, that where there had been delirium ferox, and even in more than one instance coma, no appreciable lesion could be detected in the brain or spinal chord after the patient's death. This may seem paradoxical, but it is based upon fact; and the conclusion is simply this, that in respect of typhus fever, at all events, true inflammation of the brain and its membranes is of very rare and exceptionable occurrence. Many of the cerebral symptoms in typhus are explicable on the supposition that they are caused by a temporary congestion of the intra-cranial vessels; others, it is equally probable, are due to diminished nutrition of the brain, from its receiving an impure and inadequate supply of blood; a third class of cases, including those with comatose and paralytic symptoms, may be traced to the influence of the highly carbonised and otherwise deteriorated blood which is sent to the brain and the spinal chord.

Whatever their pathology, the clinical importance of the cerebral lesions of typhus cannot be over-estimated; they are common to this fever in all ages and sexes, but we have already remarked on their greater frequency and fatality amongst individuals in the better classes of society.

In the simpler forms of the cerebral affections of means for controlling the state of nervous excitement under which the patient labours. It not unfrequently happens that the symptoms we are describing—viz. delirium tremens, sweat, and feeble circulation, with restlessness, sleeplessness, and muttering delirium—supervene in cases in which the lancet and other depletory measures have been abused in the early stages of the fever, while proper nourishment has been withheld from the patient all through under similar erroneous views. Now the way to remedy this state of things, is not by further lowering of the system of the patient by bleeding, purgation, and starvation, but by the liberal use of nourishing broths, and stimulants, including wine, brandy, whiskey, ammonia, ether, singly or combined, as the urgency of the case may require. Thus in a case in private life, half a bottle of mild but generous claret will be the best sedative which can be administered to the patient; a strong tumbler of brandy or whiskey punch will in severe cases have a like effect. We may judge that stimulants are acting well, when the pulse sinks five or ten beats, and at the same time expands in volume, the nervous excitement, sweat, and tremor disappearing, while the patient gradually sinks into a profound and refreshing sleep. The use of stimulants, under the circumstances now indicated, requires a combination of boldness and discretion on the part of the physician, while an acute judgment and much experience are indispensable; and yet under no circumstances will more decisive results be obtained from bold and well-directed treatment.

There is a variety of the cases last considered in which nervous excitement, apart from debility, is the preponderating feature; the vascular system may not be greatly depressed, and the pulse will be found moderate in volume and frequency. In many of these cases, musk is the drug which seems to act with the most specific virtue; it may be ordered in from two to five-grain doses, given every hour or every second hour, according to circumstances; it may likewise be administered, suspended in some fluid vehicle, one to two scruples in a six or eight-ounce mixture, with an ounce of mucilage to aid its mechanical suspension. It has been given in larger doses, but not with sufficient reason, in my opinion.

Opium, and the preparations of morphia, may often be used with benefit where the nervous phenomena preponderate; thus half a grain of opium, or from a quarter to half a grain of the muriate or acetate of morphia, may be given in pill at bedtime; larger doses may be occasionally useful, but we must bear in mind that opiates are entirely contra-indicated where there is any tendency to venous stagnation in the cerebral organs. Some writers of great authority even go so far as to proscribe altogether the use of opiates in fever, through an apprehension that they tend to produce venous congestion, if not coma; but I think that this apprehension is not sufficiently well grounded: undoubtedly opiates are not applicable to every case of fever, and are entirely contra-indicated when there is the slightest tendency to venous congestion, as above explained.

We have still to speak of the formidable class of cases in which the cerebral symptoms take the form of delirium ferox, with maniacal excitement, a wild and fierce expression of the eye and contracted pupil, while the combative and destructive faculties are roused, and the patient puts forth nervous and muscular exertions to a surprising degree. The symptoms which the patient now presents are entirely different from those exhibited in the condition above described as the delirium tremens of typhus. In this latter state he is fearful, and easily cowed, though his delirium may be busy, threatening, and even mischievous, when he is left alone for a while; but a word or a look from his attendant sends him cowering under the bed-clothes. In the delirium ferox, on the other hand, the patient often no longer recognises any one, and can only be controlled by physical force; he is perpetually getting out of bed, and, for want of proper attendance, fatal accidents have occasionally happened; as, for instance, from the patient getting possession of a razor or other cutting instrument, or throwing himself from a window. These cases present undoubtedly not a few points of resemblance to cerebritis or inflammation of the brain; we must only refer to what has been already said on a former occasion on this subject. The means usually employed to combat this affection are, general venesection, shaving the head, and the application of leeches, the ice-cap, cold affusion, and blisters or tartar-emetic ointment. With the exception of venesection, which I for one entirely repudiate in the treatment of typhus, each of the other remedies is well deserving of attention. In reference to shaving of the head, it may be here mentioned that we may dismiss from our minds all considerations as to sacrificing unnecessarily this natural ornament of the human person. After almost any fever, the hair, as well as the general cuticle, is shed; shaving is the means which will best promote an abundant re-growth of the hair.

If, therefore, we shave the head in fever, we are only anticipating what will ultimately have to be done. At the same time I am no advocate for the cruel and indiscriminate shaving of the hair, so often unnecessarily practised amongst the poorer classes. We must remember that if the fever be not fatal, the patients will, in all probability, have to leave hospital in a month or six weeks, and long before the hair is sufficiently grown again to afford to the head its natural covering and protection.

Leeches to the temples are undoubtedly efficacious in some instances, but in others the abstraction of even a small quantity of blood seems to aggravate the symptoms; there is often, likewise, much difficulty in applying leeches to the temples when the patient is in a state of violent delirium and offering great resistance. I make no mention of bleeding from the temporal arteries, as I consider it a wholly unjustifiable proceeding in cases of typhus. Cold affusion, which may be effected by pouring two or three quarts of water on the patient's head out of a jug from a moderate height, is a powerful agent, and must be used with great caution. Evaporating lotions and the ice-cap, made by tying up pounded ice and salt in a bladder, are useful applications, and often tranquillise the patient a good deal. Blisters and tartar-emetic ointment are more appropriate for cases in which there is a tendency to coma from venous turgescence, or effusion of serum into the ventricles. Under such circumstances, when the pupil, previously perhaps much contracted, is beginning to dilate (with or without a partial strabismus), and the breathing to assume a stertorous character, while the patient, from a state of violent delirium and nervous excitement, is becoming insensible, we must have recourse to rapid and free counter-irritation over an extensive surface of the shaven crown, by emplastrum lyttæ, acetum lyttæ (*very cautiously applied*), or by sinapisms, or more slowly by the inunction of tartar-emetic ointment. Cold affusion, performed from a height with a good volume of water and in a full stream, acts occasionally as a powerful excitant to the brain, and seems to arrest the comatose tendency. The shock which it occasions on the system in some is not free from danger, and it is at best but an *anceps remedium.* Mercurial inunction to the axillæ and groins is often had recourse to in these extreme cases; mercury internally administered is also spoken of with favour in similar circumstances by some authors. It is directed to meet cerebral inflammation, but as we have seen that this condition is one of the utmost rarity in typhus, I cannot concur in the opinion that mercurialisation is based on a rational view of the pathology of this class of cases.

But there is a still more formidable condition than any we have yet considered; no language can adequately picture the state of things we are now about to describe. You are summoned to a case in fever at about the eleventh or twelfth day of the disease; you find the patient half sitting up in bed, violent and unmanageable, sometimes screaming and terrified, at other times in the most furious condition of maniacal excitement, and barely restrained in bed by the united exertions of two or three assistants. The pulse is feeble and rapid, 130 to 140, and the patient is sweating profusely. No more desperate condition of things can be well conceived, and there is scarcely any position more embarrassing for the attending or consulting physician. What can be done under such circumstances, which will offer a chance of saving the life of the patient, whose system is working at a fearful rate of high-pressure energy, and, like some delicately organised machine, will wear itself to pieces within a very short time, if its action cannot be brought under control? The difficulty of the medical attendant's position is still further increased in those cases in which he finds, on coming to apply himself to the question of treatment, that almost every conceivable means has been already employed. Thus he will find that in some instances blood has been abstracted from the temples by leeching, cupping, or section of the temporal arteries; in some cases venesection will have been practised from the arm, and in most instances, shaving of the head, cold affusion, the ice-cap, extensive blistering, or tartar-emetic ointment will have been employed, singly or combined in various ways. Mercurialisation will have been attempted, in all probability, by the administration of the drug internally or by inunction, or in both ways. Musk, opium, and camphor will have been employed with a like want of success. Such a case will seem all but hopeless; medical interference appears but to aggravate the symptoms, and nothing apparently remains but to abandon the patient to his fate. *Nil desperandum* must, however, be the motto of the physician in this and many another crisis of his professional career. Art has still one remedy in store, and we possess yet one means more for combating this formidable affection, which we owe to the bold and fertile mind of the late Dr. Graves of Dublin. For the treatment of cases such as we have just described, Dr. Graves proposed, and used with great success, a combination of tartar emetic and opium. It may seem to be an empiric remedy, but I think its action may be explained on rational principles; and of its efficacy I can have no manner of doubt whatsoever, for I have over and over again employed it with a success that seemed as magical as it was unexpected.

The combination of tartar emetic and opium may be used as follows,—viz. one drachm of the tincture of opium, with four grains of tartar emetic, in eight ounces of camphor mixture; of this let the patient take one tablespoonful every hour, or second hour, according to circumstances. Vomiting is usually induced after the second or third dose, and a purgative effect a short time afterwards; the evacuation of biliary matter in both directions is a decidedly favourable indication. If the medicine acts well, the patient becomes gradually more tranquillised; the violent nervous excitement subsides; the pulse falls from 15 to 20 beats in a minute, that is, from 140 to 120, and becomes softer and fuller at the same time; the patient soon breaks out into a warm and comfortable perspiration, and, at the end of three or four hours, sinks gradually into a quiet and profound sleep. He may have been five days and as many nights without closing an eye, raving, screaming, and unmanageable, even in a strait-waistcoat, and now in a few hours, and with an effect little short of magical, he wakes from a deep, long, and refreshing sleep, calm, conscious, and convalescent. I am aware that there are those who still doubt the appropriateness and the efficacy of this plan of treatment; I have seen it used, and I have used it myself with the marked results above stated, and I feel it to be a bounden duty thus publicly to testify to its value.

The proportion of the tartar emetic and opium in this combination may be varied, according to the urgency of the symptoms. Two grains of tartar emetic to a drachm of tincture of opium in an eight-ounce mixture, given in tablespoonful doses, will ensure a moderate emetic and purgative effect. Four grains of tartar emetic, with two drachms of the tincture of opium, in an eight-ounce mixture, and given as above, will be a full dose of either drug; in very urgent cases a tablespoonful of this combination may be given every half hour *ad effectum*. In a case of extraordinary urgency, and in an all but desperate condition, such that the late Sir Philip Crampton, Surgeon-General, considered that even a very few leeches would have killed the patient, Dr. Graves, *en désespoir des causes*, as it seems, ordered eight grains of tartar emetic, with one ounce of syrup of white poppies, with one of mucilage and six of water. Of this mixture a tablespoonful was given every half hour; but though slight nausea was produced, the patient did not vomit until after the seventh dose; the eighth dose produced copious vomiting of mucous and bilious fluid. This appears to have been one of those dreadful cases in which the patient, overcoming all resistance, gets out of bed, and, with no other covering but his night dress, forces his way through the house. After the second vomiting he was so far tranquillised as to allow himself to be put to bed. In all, this patient took twelve grains of tartar emetic, the use of which was extended over near three days; he ultimately recovered, and the case is one in every respect most remarkable and instructive. There is some reason to think that a combination of musk and tartar emetic produces somewhat analogous effects on the animal system. Dr. Graves remarks on the smallness of the quantity of opium which is sufficient to induce sleep in this combination: the physiological effect of the tartar emetic is likewise worthy of note; under its action the pulse is speedily reduced in frequency, while it is increased in volume.

SECONDARY LESIONS OF THE CIRCULATING ORGANS.

Under this head we have to consider several important lesions of the circulating apparatus, and which affect both the central organs and the peripheral circulation. The following are the principal forms of lesion affecting the circulating apparatus which we find to occur in the course of a case of typhus; viz.: —

1. A general feebleness of the circulation, as shown by frequent but feeble pulse at the wrist, feeble but equable pulsation in the various subcutaneous arterial trunks, and a corresponding feebleness of the cardiac impulse, the sounds still retaining their natural proportions.

2. A state in which there is a want of uniformity in the force and volume of the pulse in various arterial trunks.

3. A state in which there is, as it were, an opposition between the state of the pulse and that of the heart. This may be presented in two ways; for instance, we may have a heart acting with great *apparent* intensity, the impulse in the precordial region

being violent and tumultuous, while the pulse at the wrist is exceedingly weak, and in some instances all but extinguished. Again, we meet with cases in which the radial, carotid, or other vessels seem to be acting with redoubled energy, and yet, when the hand and stethoscope are applied to the precordial region, we have unequivocal evidence that the action of the ventricles is feeble to a degree.

4. A state in which the failure of the circulation seems to commence at the heart, and in which there is good reason to believe that the muscular texture of the heart is itself seriously implicated, the impulse and first sound being altered in character, sensibly diminished, or, it may be, wholly suppressed.

5. States in which, subsequent to the true typhus period, modification of one or both sounds of the heart is observed for a certain time.

It is not easy to fix a standard for the pulse in typhus; a safe, and, so to speak, *normal* state of typhus is attended by a pulse of moderate volume and force, and which is usually somewhat under 120 in a minute, while the heart's action is equable and of corresponding vigour. While this condition of things lasts the case is seldom one of danger. Indeed, with few exceptions, the state of the pulse and heart is throughout the most reliable guide we have in typhus. Some favourable, but very exceptional, cases will be met with from time to time, in which the characters of the heart and pulse are perfectly equable and uniform throughout to the end of the fever. It is more common, however, to find a certain amount of failure in the circulation, as a prominent feature in the case, after the seventh or eighth day. The first indication which presents moderate force and volume of the heart and radial pulse, the abdominal aorta, or the iliac arteries, or both, are felt to act with inordinate vigour. There is nothing more striking in the course of fever than the manner in which the several parts of the vascular system seem to act with almost perfect independence of each other.

Observations of this kind, which the practical physician can verify for himself in the course of fever, tend to show that the heart is not the sole agent in maintaining the circulation; if it were, we never could have the combination of a feeble heart and an excited and strongly acting abdominal aorta.

A total extinction of the pulse is met with only in extreme cases of typhus, or in the period of profound collapse which precedes death. The pulse is, however, often so weak, thready, and "shabby," that it requires great experience and delicacy of touch to be able to feel it at all in some cases. The highest rate which the pulse reaches may be stated to be between 140 and 150; it has been said to reach much higher than this, but I cannot verify the observation from personal experience. Pulse-rate must be regarded as a very important indication in the progress of any case of fever; if, as before stated, it passes 120, we are warranted in regarding it as a symptom of danger. Irregularity in its beats, inequality in volume, or intermission, are likewise unfavourable indications. I have known an irregularity by intermission of every tenth beat to be the only unfavourable sign for days in cases which subsequently proved fatal. On the other hand, we will find when the case is about to mend, that the first favourable indication is to be got from the pulse.

In the sections on treatment this subject will be more fully entered into. It will be sufficient to state here that we observe in practice two opposite effects on the circulation as the result of treatment; in one set of cases the circulation is quickened and excited, and all the patient's symptoms are rendered worse by the exhibition of stimulants; such cases very generally prove fatal. In the other class of cases stimulants lower the frequency of the pulse, and at the same time increase its volume; the patient becomes tranquillised, and all the other symptoms improve: such cases generally recover, however unfavourable they may have looked at first.

The state of the circulation in fever, however, can only be rightly judged of when the heart and pulse are both examined with care from day to day; we have seen that in fever we cannot argue from the state of the one to the state of the other. The examination of the heart from day to day in typhus forms an indispensable part of the duties of the physician. The impulse as well as the sounds of the organ must be carefully explored at each visit, and the slightest changes noted.

It is not uncommon to find that when the general nervous energies become depressed by the seventh or eighth day, the impulse of the heart undergoes a slight diminution in force; the hand must be carefully placed in uniform apposition with the precordial region to detect the extent and force of the heart's action. Dr. Stokes first called attention to a singular class of observations, by which he has shown that in many cases of typhus the impulse of the heart becomes less and less from day to day, and this has been known to proceed to such an extent that of the voluntary muscles in typhus; Laennec speaks of a gluey or fishy state of the muscles, supposed to have some connection with other phenomena of putrescence in the so-called putrid fevers.

Louis states, as the result of extensive observations, that he has found the muscular texture of the heart in typhus of less consistence than natural in a considerable number of cases; in some instances the change was very marked, the heart being so flaccid that it had no precise form, but, like a wet cloth, fell into any shape according to the way it was placed on the table; it had little or no power of cohesion, and it was easily broken through. Louis describes the internal surface of the auricles and ventricles as being of a deep violet-red colour, which he ascribes to imbibition of blood, and not to the effects of inflammation; this latter agency he for several reasons excludes from amongst the possible causes of the changes of the heart in question.

Louis's results further show that the frequency and extent of the softening of the heart's texture are in proportion to the early fatality of the disease; the heart being found softened in nearly half of those patients who die between the eighth and twentieth day of the fever. He regards the change in the heart as analogous to that of the liver and spleen in typhus. Stokes makes the observation, that in those cases in which there was marked softening of the heart the patients exhibited during life a dark-coloured and abundant petechial eruption, while the mouth was covered with sordes, and the body exhaled the peculiar fœtor of typhus, extreme prostration and stupor being also generally present.

There is no ground for supposing that the state of the heart now under consideration is the result of putrefactive decomposition; amongst other reasons against this view, it may be stated that the change is not always general throughout the heart, as it would be if it resulted from decomposition; it is often confined to the left ventricle, and it is usually more developed in this situation even when the other parts of the heart are affected. It is not to be expected that every epidemic of typhus fever will present the same proportion of cases in which the heart becomes affected, and in every epidemic numbers of cases occur in which there is no evidence whatever during life or after death that the heart has been implicated in any manner.

In some few rare instances a systolic murmur, occasionally of a musical character, has been noticed. But it is in certain cases of non-maculated fever, occurring in connection with or at the end of typhus epidemics, that the most marked form of murmur has been observed in the heart. The cases in which these observations were made occurred in the Meath Hospital, in the city of Dublin, and were noted by Dr. Heslop, now of Birmingham, and the author. They were cases of non-maculated relapsing fever, and it was in the first relapse that a murmur was observed to attend the first sound of the heart; the singular peculiarity of this murmur was, that when the patient sat up in bed it diminished so as to be scarcely perceptible. It was further noted that the murmur disappeared as the patient progressed in convalescence. In some instances, a prolongation of the first sound of the heart to nearly double its ordinary duration, but without murmur, was remarked.

SECONDARY AFFECTIONS OF THE RESPIRATORY ORGANS.

The principal affections of the chest in the typhus fever of this country are bronchitis and pneumonia.

Bronchitis forms at once the most frequent and the most formidable of the secondary lesions of the typhus of Ireland; it has been, in fact, an all but constant affection in every case of typhus during the epidemics of recent times. So much has this been the case that, as before observed, the term "catarrhal typhus" has become a familiar designation with many practitioners.

In most of the chest affections in typhus, there is a remarkable and insidious latency of the early symptoms. Again, we often find that the bronchitis and pneumonia of typhus pass suddenly into a fully developed condition, and that there is, as it were, an abortion or suppression of the ordinary first and second stages. Thus it will sometimes happen that the first indication we get of the presence of inflammation of the lung, in a case of fever supposed to be progressing favourably, is the existence of extensive dulness on percussion over a large extent of surface, or an intense muco-crepitating râle pervading both lungs, anteriorly and posteriorly.

It is unnecessary for us here to recapitulate the signs and symptoms by which ordinary bronchitis or pneumonia is to be recognised. Cough, dyspnœa, sonorous, sibilant, and subsequently soft mucous râles (when present), indicate bronchitis in typhus, as they do under ordinary circumstances. But in typhus the practical difficulty arises from this circumstance, that the cough is slight and wholly disproportionate to the amount of bronchial lesion present; the same is to be said of the symptom of dyspnœa; while the pyrexial reaction is not such as to show anything remarkable in the case. For these reasons the first periods of the disease pass by without any suspicion being awakened on the part of the medical attendant, unless he has been put on his guard by previous experience, or by a sound education in the pathology of typhus. Unless the patient's chest be daily examined with the stethoscope, this formidable lesion will in a couple of days have made such headway as to baffle the best directed efforts of the physician. Many a patient is thus irrecoverably lost, almost before his attendant suspects that there is anything unusual in the case.

To the experienced physician, the approach of an important thoracic lesion is often indicated by a slight increase in the general pyrexial excitement of his patient's system; the pulse is observed to be a little harder and quicker, and the respiration to be a little shorter and more hurried. Cough, with considerable dyspnœa and subsequently expectoration, and other manifest symptoms of bronchitis, are no doubt often present to such an extent as at once to declare the nature of the affection. But though this class of cases is occasionally fatal, it is not from them that most danger is to be apprehended. They admit of being diagnosed early, and generally yield to appropriate remedies when timely administered.

The most formidable variety of bronchitis is that which, commencing insidiously, and being latent as far as symptoms are concerned, quickly engages a large extent of the bronchial mucous membrane in one or both lungs. There is little or no cough, and the expectoration is inconsiderable; while there is no dyspnœa or other symptom to attract attention to the patient's chest. Supposing a case of this kind to be neglected for a couple of days, or rather overlooked in consequence of the patient's chest not being examined daily with the stethoscope, the bronchial affection, latent and unnoticed hitherto, suddenly reaches an alarming height, the case is in imminent danger, and in a large majority of such instances no efforts will save the patient's life. What happens in these cases is this: the bronchitis was for the first two or three days confined to the primary and secondary tubes; the tendency of the disease is, however, to spread along the mucous surface of the bronchi, and the moment the tertiary and ultimate ramifications of these tubes become invaded, the symptoms assume an alarming character. This is fully explained by the condition found to exist on post-mortem examination.

On opening the thorax in such cases the lungs do not fully collapse, a certain quantity of air being mechanically imprisoned in the smaller bronchial ramifications and air-cells. On slitting up the trachea and bronchi, these tubes are found filled with a viscid, glairy secretion, which extends down to the minute air-cells, filling the whole bronchial tree as completely as if forcibly injected from a syringe. The mucous membrane is at the same time found thick, soft, and somewhat of a pulpy consistence; the colour of the mucous surface is likewise altered,—it is usually of a deep reddish tint. The superficial epithelium can be scraped off in quantity, exposing a condition of intense vascular injection beneath, with great turgescence of the basement membrane. These conditions imply a considerable diminution in the calibre of the entire bronchial tree, together with a superabundant secretion of viscid mucus. But it is probable that there is another condition superadded during life—namely, that of a somewhat paralytic state of the bronchial muscles; it is now well known that the longitudinal and circular muscular fibres, which constitute a distinct coat of the bronchial tubes, play a most important part in the expiratory and expectorant functions. In the low state of innervation which characterises typhus, these muscular fibres of the bronchi, the so-called muscles of Reisseissen, become paralytic. The bronchi are thus unable to throw off the secretion poured into them in excess from the softened and highly vascular mucous surface; the secretion thus goes on accumulating in the surcharged bronchi, and the patient finally dies a mechanical death. Under ordinary circumstances, even a very small amount of secretion poured out into any part of the bronchi acts as an irritant on the muscles of Reisseissen, which are thrown into active contraction, evidenced by forcible expiratory and expectorant efforts, realised to our ordinary senses by the phenomenon we denominate cough, and by the ejection of sputa. As will be presently considered, our main indication for rational treatment in these cases consists in the use of remedies which act by irritating and stimulating the paralysed bronchi to throw off the secretion with which they are overloaded.

To return to the consideration of the symptoms during life: we find that when the minute bronchi become affected, dyspnœa, hurried breathing, lividity of the face, and general oppression are apparent. The respiration rises to 40, 50, or even 60 per minute. There is a corresponding alteration in the pulse, which goes up to 130, 140, or in extreme cases, 160. Muco-crepitating râle is now audible in all parts of the chest, and towards the close of the case a loud rattle is produced in the bronchi and trachea, audible at some distance from the patient's bed. Notwithstanding the superabundant secretion which takes place into the bronchi, expectoration is either very scanty or altogether suppressed. It very frequently happens that there is profuse and persistent sweat over the whole body at this period; this is, in my experience, only an additional symptom of fatal augury.

In considering the treatment of the catarrhal affections of typhus, the golden rule is to anticipate them if possible. If they are allowed to steal a march on us, even for a single day, their progress is so rapid, and their effects are so overwhelming on a patient already prostrated by other influences, that there is but little chance of saving life in many instances. It cannot be too strongly impressed on the student and junior physician, that to examine the chest and all other organs carefully from day to day is a part of his duty which he cannot neglect without incurring the gravest responsibilities. He must remember that he is not to wait for cough, pain in the chest, or any of the ordinary signs and symptoms of bronchitis; when such signs and symptoms become manifest, the patient is too often so far gone that his case is utterly hopeless. When, therefore, the stethoscope reveals the presence of sonorous or sibilant râles in any considerable portion of either lung, it is high time to take the alarm, and to direct prompt measures of treatment to the chest. The locality in which râles, whether dry or moist, first make their appearance may enable us to form some estimate of the probable gravity of the case; thus, râles commencing in the anterior and upper part of the chest indicate that the bronchial affection will in all probability be one of great severity.

Depletion is the first means which will suggest itself to the mind of most practitioners, but experience shows us that we have little to expect from it; venesection is, I hold, simply out of the question, but local depletion may in some cases be resorted to. The rapidity with which the bronchial affection invades both lungs throughout a large part of their extent, precludes the use of local abstraction of blood by cupping or leeching in most cases. When, however, the bronchitis is found limited to any defined portion of lung substance, the wet cupping-glass may be used with effect, and from four to six, or in extreme cases, eight ounces of blood abstracted. Dry cupping is a means of much more general application, and is of great utility in many cases, in which, owing to the extreme prostration of the patient, we dare not abstract a single ounce of blood from the body. The chest may be extensively dry-cupped, both before and behind, and this is often attended with great relief to the patient; this operation must be rapidly and carefully done, and with as little exposure and fatigue to the patient as possible.

Counter-irritation offers another and effective means for dealing with cases of this kind. Rubefacient liniments, sinapisms, and the ordinary emplastrum lyttæ may be used, as circumstances seem to warrant. As a general rule, vesication is to be employed immediately over the part principally affected; but, unless for special reasons, I think it better that we should avoid blisters to the posterior parts of the chest in typhus, as there is often a low action set up in the blistered surfaces, which leads to the formation of troublesome bedsores when blisters are applied to dependent parts, or those subjected to pressure. In most cases a blister, six to eight inches square, applied over the sternum, will answer all purposes; it seems to act in two principal ways, first, by derivation and depletion, in consequence of the serous fluid which it abstracts from the blood, and secondly, as an irritant and stimulant to the paralysed nerves of respiration. In some cases, where the prostration of the system is extreme, vesication cannot be effected by the common blister, and it will be necessary to have recourse to acetum lyttæ, which may be lightly brushed over the surface, when it rapidly produces extensive vesication in most instances; but I have known cases in which even this application failed, owing to the utter want of reaction in the patient's system, though death did not ensue until four and twenty hours subsequently.

Tartar emetic will seem an obvious remedy in this as in other forms of bronchitis; but there is one fatal objection to its use, namely, the already depressed condition of the circulation. We cannot, therefore, include it in the articles of the materia medica likely to prove useful in typhous bronchitis. Mercury given to salivation is likewise inapplicable as a remedy in these cases. But in the form of hydrargyrum cum cretâ it may be used in combination with hippo and squill, to produce an alterative effect and promote expectoration. Thus from one to two grains of hydrargyrum cum cretâ may be given with half a grain of hippo and a quarter of a grain of squill, in the form of pill or powder, every second or third hour.

Such means as those now indicated are entitled to a fair trial at the outset of the affection. But if no good result be manifest in from twelve to twenty-four hours, we must not lose valuable time by further delay, and more active medicines are now called for. The decoction of polygala seneka, with carbonate of ammonia (half a drachm to two drachms), tincture of squill, and hippo wine, constitute a remedy of great value and efficacy in numerous cases. The Virginian snake root is in itself a powerful stimulant and expectorant, and these latter effects of the drug are much enhanced by the addition of ammonia. There is only one objection to this latter remedy, namely, its tendency to run off by the bowels in many cases; if it produce this effect we must of course abandon its use, and trust to the action of diffusible stimuli in other forms, as ether, brandy, wine, punch, &c. Cases will occur in which all these therapeutical means are tried in combination, and in which no relief is produced to the urgent symptoms of thoracic oppression and mechanical filling up of the bronchial tubes. Under these circumstances the case is *in extremis*, as indicated by the audible rattle in the bronchi, and the lividity and prostration of the patient. In such a predicament we have but one or two remedies more to fall back upon, ere we abandon the case as hopeless. A mustard emetic will be sometimes found to act as a charm in unloading the bronchial system. It seems to act by a reflex agency through the gastric filaments of the vagi upon the pulmonic plexuses, stimulating the semi-paralysed bronchial muscles, promoting copious expectoration, and, by allowing free ingress of air, causing renewed oxidation of the blood, and general stimulation of the system. Over and over again it occurs that the timely exhibition of a mustard emetic not only saves a patient from the immediate danger of impending suffocation, but becomes the turning point to convalescence with an effect that is quite surprising.

Turpentine constitutes a remedy of extraordinary efficacy in many cases of typhous bronchitis, when almost at the last gasp. In doses of from fifteen to twenty drops, spirit of turpentine is a powerful expectorant; in extreme cases it may be employed in drachm doses. It may be given in almond mixture, with the addition of a drachm or two of chloric ether to the eight-ounce bottle. The valuable effects of turpentine in this class of cases are by no means sufficiently known; it seems to act as a specific irritant upon the bronchial membrane, inducing cough and expulsive contraction of the semi-paralytic circular and longitudinal muscular fibres. After the third or fourth dose, a patient in whom passive bronchial effusion has been rapidly accumulating, and in whom the inertness of the bronchial tree is shown by the absence of cough, or any attempt to expectorate, will begin to throw off by cough and expectoration large quantities of viscid and frothy mucus. The effects produced in a few hours in these cases is perfectly astonishing. With the re-admission of air into the lungs now permitted by the evacuation of the viscid contents of the bronchi, the blood is again rapidly and completely oxygenated, and the system of the patient invigorated and refreshed. This is a new triumph for turpentine, hardly anticipated by the author of the "*Currus triumphalis e Terebintho.*"

Pneumonia.—Next to bronchitis, pneumonia is perhaps the most formidable secondary lesion which we meet with in typhus. Though the catarrhal affection exists commonly enough without consolidation of the lung tissue, it is extremely rare to find pneumonia occurring in typhus without an accompanying bronchitis of greater or less extent. Indeed, one of the most formidable aspects in which we have to consider this form of pneumonia, is in connection with capillary bronchitis invading one or both lungs. The pneumonia occurring in typhus is distinguished from the ordinary sthenic inflammation of the lung by the following characters — namely, the low prostration of the patient; the sudden and silent invasion of the disease, with a total absence of the usual premonitory symptoms; and the more or less complete suppression or abortion of the usual first stages of this affection as presented in a healthy system. For example, we find the lung suddenly passing into a condition of complete consolidation, with dulness on percussion, bronchial respiration, and broncophony. It is also to be observed that the disease first implicates those parts of the lung which ordinarily escape, or are last affected in sthenic pneumonia; in other words, in typhous pneumonia the upper and anterior parts of the lung are engaged in preference to the lower and posterior. The disease likewise exhibits a marked tendency to early fatal issue; and it will be observed throughout the course of the case, that the sputa are in excessively small quantity or altogether suppressed; the cough is short and dry, and the pain in the lung is inconsiderable. Complete dulness on percussion is early developed, and persistent throughout, except in those singular cases in which it is replaced by a suddenly developed tympanitic sound. This is one of the most singular phenomena we are acquainted with in the acoustics of thoracic disease. In a situation in which we have determined the existence of complete and absolute dulness on a given day, we find on the next visit that the dulness is replaced by a sound of tympanitic character. When a case of this kind is seen for the first time, it will be supposed that pneumo-thorax has been suddenly developed; but on carefully analysing the percussion sound, it is observed to be one not of tympanitic clearness but of tympanitic dulness. This seems a paradoxical expression, but when the sound in question is heard, it will be found that it is well described by the term employed. It conveys the idea of a deeply-seated resonance being conveyed through a superficial layer of solid texture, the latter causing the dull sound, while the former gives rise to the tympanitic resonance. Many explanations have been offered for this singular phenomenon. I believe it to be caused by a mass of densely-solidified lung in close apposition, on the one hand, with either bronchus, and on the other with the wall of the chest, and thus conveying to the surface directly the clear and resonant percussion notes developed by the vibrations of the air in the bronchi.

When the lungs reach the condition of complete antero-superior dulness, the case must be looked upon as one of great severity. In the low condition in which the patient already is, the pneumonic inflammation is in itself sufficient to turn the scale and lead to a fatal issue. The fatal event often comes with great surprise upon those, whose notions of pathology are so mechanical that they expect the general symptoms of a case to be always in proportion to the amount of local disease. To such persons it is entirely unintelligible that a patient shall die of an inflammation of the lung, which engages not more than a hand's breadth of the organ. And yet this is often the case in the pneumonia of typhus. The occurrence of pulmonic inflammation should, therefore, in all cases make us most guarded in prognosis, and active while judicious in treatment, knowing as we do that many of these cases sink with extraordinary rapidity. But we have other dangers to apprehend in cases of this kind. The bronchitis of typhus is often, even in its most aggravated and fatal forms, an isolated lesion, and the only one from which the patient suffers. This is not so with the pneumonic inflammation of the lung in typhus, which is almost always associated with a certain amount of bronchitis. We have already seen what dangers are to be apprehended from typhoid bronchitis; it is still more to be feared when it occurs in connection with pneumonia.

In the low typhoid inflammation of the lung, even when not fatal in the primary periods, we have still further dangers to apprehend. Thus we find sudden purulent infiltration, abscesses or gangrene suddenly developed in a lung which has been the seat of typhoid consolidation. When the organ passes into the stage of purulent infiltration, we find a slight that the sputa are in excessively small quantity or altogether suppressed; the cough is short and dry, and the pain in the lung is inconsiderable. Complete dulness on percussion is early developed, and persistent throughout, except in those singular cases in which it is replaced by a suddenly developed tympanitic sound. This is one of the most singular phenomena we are acquainted with in the acoustics of thoracic disease. In a situation in which we have determined the existence of complete and absolute dulness on a given day, we find on the next visit that the dulness is replaced by a sound of tympanitic character. When a case of this kind is seen for the first time, it will be supposed that pneumo-thorax has been suddenly developed; but on carefully analysing the percussion sound, it is observed to be one not of tympanitic clearness but of tympanitic dulness. This seems a paradoxical expression, but when the sound in question is heard, it will be found that it is well described by the term employed. It conveys the idea of a deeply-seated resonance being conveyed through a superficial layer of solid texture, the latter causing the dull sound, while the former gives rise to the tympanitic resonance. Many explanations have been offered for this singular phenomenon. I believe it to be caused by a mass of densely-solidified lung in close apposition, on the one hand, with either bronchus, and on the other with the wall of the chest, and thus conveying to the surface directly the clear and resonant percussion notes developed by the vibrations of the air in the bronchi.

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diminution in the dulness on percussion, with large muco-crepitating râle and purulent expectoration. Abscess is indicated by the sudden development of the signs of cavity, gargouillement or gurgling, and copious purulent, sometimes fœtid, expectoration. Gangrene of the lung is indicated by the usual signs of this affection, and the horribly fœtid and unmistakeable odour which accompanies it. As these conditions of the lung come under the general rules of thoracic diagnosis, we need not consider them more in detail in this place.

The treatment of typhoid pneumonia is, on the whole, very much that of typhoid bronchitis; general bleeding is out of the question, and even local abstraction of blood must be employed with caution. Cupping, to the extent of six to eight ounces, is in many cases useful, and in some instances it may be repeated with advantage. Dry-cupping is likewise beneficial, but is, I think, not so efficacious in pneumonia as in bronchitis. Vesication, with the emplastrum or acetum lyttæ as in bronchitis, may be employed. In selecting a general plan of treatment in typhoid pneumonia, we are generally compelled to reject altogether the use of tartar-emetic, from the low state of the patient's system. Mercury is then the only alternative, and if its use be determined on, we must endeavour to get the patient under its influence as rapidly as possible. This we can sometimes effect within a day and night by grain doses of calomel, properly masked with opium, every hour. Others prefer larger doses at the outset, and two or three grain doses in the form of pill every third or fourth hour. Mercurial inunction in the groin and axillæ, and mercurial dressings to any blistered surfaces which exist, will promote the specific action of this drug. Hydrargyrum cum cretâ (two to three grains) with hippo and squill (half a grain of each) is much recommended by some practitioners, and is certainly useful in the early stages of those cases in which secretion is suspended. It is never to be forgotten, however, that these cases require free stimulation, which must always form a prominent item in the treatment. The pulse must be carefully watched, and when it shows the slightest tendency to rise in frequency, while it diminishes in volume, it is an unmistakeable indication for the use of ammonia, wine, or brandy, or all three combined. It will often be noticed that the pulse rises steadily as the pneumonic affection advances, till it reaches 140, 150, or even more, per minute, being at the same time excessively feeble, and readily extinguishable on the slightest pressure with the finger.

In singular contrast with the state of the pulse, violent thumping action of the heart is often to be observed in these cases; this is perceptible by the hand placed over the præcordial region, and in some instances, where the solidification of the lung occurs at the right side, the shock of the heart may be felt and heard with great force in the right axilla. No combination of signs can possibly be observed worse than the following — namely, solidified lung on the tenth or twelfth day of typhus, with a pulse at 140, or it may be as high as 150, and weak, thready, and shabby, while the heart is pounding with *apparently* violent efforts,—but we know incomplete contraction of its ventricles. Till a decided impression has been made on the pulse and heart, the case must be pronounced one of most imminent danger.

When profuse sweat is superadded to these symptoms, I know of almost nothing which warrants us in indulging a single hope of the case. Counter-irritants, mercurials and stimulants, singly or in combination, will often be found to fail in many of these cases, especially whenever bronchitis is combined with pneumonia or supervenes upon it. Under these circumstances, turpentine must be had resource to, and occasionally its effects are almost magical. It may be given in fifteen, twenty, or thirty-drop doses, or, in extreme cases, in teaspoonfuls every hour till cough and expectoration are produced. The tolerance of stimulants in this class of affections is something quite remarkable. Persons of habitually temperate habits, and even females, will, when in typhus, take with impunity, in the course of a very few hours, a quantity of wine, punch, or raw brandy, which in the state of health would make them stupidly and hopelessly intoxicated; and yet while in the typhoid state, the most liberal amount of stimulants seems to be expended in keeping the system at par. Without stimulants the patient sinks visibly into low muttering delirium, while the pulse is up to 140. Under the influence of stimulants, the pulse in a favourable case will be observed to fall from hour to hour till it reaches the comparatively safe rate of 110 or 120; for with moderate volume, fair tension and equable and uniform cardiac action, we may consider a pulse of 120 as tolerably safe and reliable. The faculties all this time are becoming more and more clear, and, singular as it may seem, the patient is becoming more and more rational and coherent the deeper he drinks, which, it is needless to say, is the opposite to what would occur if he were in the state of health.

It is an observation founded on experience, and one full of practical import, that on the whole the free use of stimulants in typhus is far more successful in saving life amongst persons who have been previously of abstemious habits, than in those who have been addicted to intemperance. In this latter class of cases, likewise, stimulants are not infrequently badly tolerated by the system, and instead of tranquillising the patient, cause nervous excitement and occasionally violent delirium. For these reasons we are sometimes obliged to throw away our last and best chance of saving the patient, when all other means have failed.

We must always have in view at the outset of thoracic lesions in typhus, that we have to do with a silent and insidious enemy, who displays his forces suddenly, and when we are least prepared for the attack. We have also to remember that an amount of disease, which, under other circumstances, would make but little impression on the patient's system, may now prostrate it completely and fatally. It must therefore be ever a leading indication in the treatment of this class of affections, not only to avoid lowering the system by depletory or exhaustive measures, but to anticipate and prevent that sinking, which experience shows us to be the inevitable concomitant of the typhous state. We must therefore fortify the system, while we endeavour to cure the general as well as the local diseases.

Typhoid Pleuritis.—This is a comparatively rare affection, and it is somewhat remarkable that pleural affections are much more frequent as secondary lesions of the *typhoid* than of the *typhus* fevers. When pleuritis occurs in connection with typhus, it my conviction, that any true follicular lesion of the intestine is as rare in the former (typhus fever) as it is common in the latter (typhoid fever).

The most formidable affection presenting itself in the intestines in typhus, is that in which we have a congested, but at the same time weakened and atonic, state of the mucous membrane. Diarrhœa, and more or less mucous irritation precede this condition; and after a time we have meteorism or gaseous distension of the intestines; the abdomen swells to an enormous extent, and we find drum-like or tympanitic sound on percussion. The mechanical state of distension of the abdomen is a source of distress in two ways: firstly, from the accumulation of air in the stomach and intestines themselves; and next, from mechanical interference with the process of respiration, the descent of the diaphragm being impeded or prevented by the swollen state of the abdomen. We often find in connection with this state an irritation of the gastric membrane, such that the patient rejects a portion of almost everything that is swallowed; there is at the same time an irritable action of the intestines, leading to constant diarrhœa, but with the discharge of only very small quantities of fluid matter. Under these circumstances, drink, food, and medicines accumulate in the intestinal tract, while gases are generated in excess. The distress caused by this accumulation of air and fluid is extreme; the absorbent powers of the mucous surface seem for a time to be in abeyance; while the muscular fibres are paralysed, and the stomach and intestines seem incapable of freeing themselves of their contents by peristaltic or anti-peristaltic action. There can be very little doubt that the state above described is one often brought on by the injudicious use of medicines, aliments, and the farrago of substances supposed to be proper or useful in the sick room. The injudicious use of mercurial, drastic, or saline purgatives at the outset of the disease, leads in the first instance to hypercatharsis; and though this may be checked by astringents, we still have to apprehend an atonic state of the muscular coat of the intestines, and its results as above described. The excessive use, or rather abuse, of drinks and fruits, and the *slops* supposed to be necessary to the fever patient, conduce to a like effect.

The state of meteorism or tympanitis is always to be regarded as a formidable complication in fever; and when developed to an extreme degree and persistent for two or three days, resisting treatment, it is a symptom of all but fatal import. In the chapter on the treatment of fever, rules will be found laid down as to the management of the patient's diet and medicines; and it will be found that moderation in medicines and aliments from the outset of the disease affords the best chance of obviating the occurrence of this as well as many others of the incidental lesions of typhus. When present the affection is best treated by turpentine stupes, carminative draughts, and suitable enemata; while at the same time the system generally is well supported by stimulants and judicious nourishment. Do what we will, however, many of these cases seem utterly intractable, when once tympanitis is established to any considerable degree; the case is all the worse if the stomach is intolerant of food or medicine, while diarrhœa is present. When at the same time loud gurgling sounds give evidence of the presence of large quantities of air and fluid in the intestinal canal, the case is still more unfavourable.

Hæmorrhage from the mucous surface must be regarded as an occasional though rare attendant upon typhus. Its true pathology seems to be, that it is a symptom related rather to the condition of purpura hæmorrhagica, so often found in connexion with typhous epidemics in this country (Ireland), than with the typhous state itself.

Astringents, such as tannic or gallic acid, acetate of lead, alum, perchloride of iron, or chromic acid, may be administered by the mouth, while the ice-filled plug may be applied to the anus.

Hæmorrhage from the stomach is an event of unusual occurrence in typhus; it is to be treated on the ordinary principles, by the employment of any of the above astringents, iced drinks, &c.

Diseases of the other viscera of the abdomen are of comparative rarity in typhus. Affections of the liver, spleen, and kidneys are very uncommon, if we except congestion of these viscera, which occurs to a variable extent in some cases. This state is seldom recognisable during life, and is only discovered in post-mortem examinations. Deposits in the mesenteric glands are likewise of extreme rarity in pure typhus. In this respect, typhus contrasts remarkably with typhoid, in which secondary processes of disease, with deposits of ill-organised exudative matter, are so common in the mesenteric glands and spleen, and occasionally in other parts. The practitioner must be on his guard not to mistake for evidences of renal disease, the symptoms we have already noticed in connection with the urine. This secretion, we have already seen, may be scanty, high coloured, and surcharged with lithates at an early period of the disease; chemical examination shows us that the urea and other constituents are increased, all of which phenomena are to be interpreted as the result of increased metamorphosis of the tissues, showing itself in increased elimination of effete products by such emunctory organs as the kidneys. The kidneys, like other organs, partake occasionally of the tendency to congestion, and we sometimes find slight traces of albumen, and even of the red particles of the blood in the urine as the result of the renal substance being surcharged with blood. Albumen in the urine seems to have no other significance whatever in fever than this, that it is the result of mechanical pressure of blood on the urinary tubules. At a later stage of the fever, we sometimes find the urine becoming ammoniacal, and containing phosphates in excess; this usually happens when the case is excessively low and prostrate, and it is amongst other things an indication for high stimulation. In the latter periods of a case of typhus, we not unfrequently find that there is loss of voluntary control over the sphincters of the anus and urethra. Involuntary passage of the urine and fæces is a grave and troublesome symptom in many cases of fever, but is not always a fatal one. In many cases the urine constantly dribbles away in small quantities, the bladder is kept perpetually drained, and no mischief accrues to the patient beyond the soakage of the bed-clothes, and the irritation of parts wetted by the urine. In other cases perpetual dribbling of urine goes on, and this is supposed to indicate that the bladder is empty; but on careful examination by palpation and percussion in the hypogastric region, the bladder is found of large dimensions, reaching high above the pubes, and containing several quarts of urine, which, on being drawn off by the catheter, is found to be turbid, and to have a highly ammoniacal fœtor. This state of the bladder seems analogous to that which we have before described as occurring in the intestines, in which there is a paralytic state of the muscular fibres, and a passive distension of these viscera from their accumulating contents. In the case of the intestinal paralysis, with meteorism, as before explained, we have a constant diarrhœa, but it drains away only a small amount of the liquids accumulated in the small and large intestines. In the case of the bladder, urine accumulates, paralysis of the muscular walls of this viscus ensues, a small portion of fluid dribbles away, and it is supposed that the organ is daily emptied, while in fact fœtid urine is being accumulated in large quantities. Where this condition exists to an extreme degree, we find when the patient dies the bladder converted into an enormous passive sack, containing two or three quarts, sometimes more, of fluid, with a highly ammoniacal odour; the ureters are sometimes distended in such cases. It will be seen at once how necessary it is that we shall not take the report of friends, nurses, or other attendants, as to the state of the urinary secretion in typhus cases. We ought, indeed, to satisfy ourselves, by ocular proof, that urine is regularly voided every day; the vesical region must be carefully palpated and percussed, and if there be a doubt on our minds, the catheter must be introduced, to test the actual condition of the bladder.

Suppression of urine.— This, always a formidable and constantly a fatal symptom, is not by any means common in typhus. It seems to be a more usual attendant on the remittent class of fevers than on those of continued type. It certainly is not so often met with in the fevers of these countries as in those of warmer latitudes. Suppression of urine, when it does occur, is always a symptom for most serious alarm. Sometimes it will be observed that there is a gradual diminution of the urinary secretion; occasionally it occurs in quite a sudden manner, and the catheter is introduced under the impression that there is retention of urine, but not a drop is brought away. The symptoms which arise in this condition are variable, and indeed of an entirely opposite kind in different cases. Thus we sometimes have symptoms of narcotic poisoning ending in coma, while in other cases the patient remains in possession of his faculties almost to the last. Active measures must be at once employed in cases of this kind, including cupping and counter-irritation over the loins, with such medicines as the acetate and nitrate of potash internally. The infusion, tincture, and oil of juniper may likewise be used in suitable proportions; the oil of juniper may be used as an embrocation dissolved in any covenient menstruum, in the proportion of two drachms of the oil to four or six ounces of the vehicle. It is to be said, however, that few cases of fever admit of successful treatment in which total suppression of urine has been present for a period of twenty-four hours.

SECONDARY LESIONS OF THE CUTANEOUS SYSTEM.

Under this head we have to consider a class of affections often of a formidable character. In the course for weeks and sometimes months, after he has got through the primary fever. Bed-sores most commonly occur at the end of the second or at the beginning of the third week of typhus; this being the period at which the vital powers are at the lowest ebb, it is not surprising that many patients sink under the additional shock of an extensive bed-sore.

The first appearance of erythematous patches on the posterior portions of the body, or other parts subjected to pressure, calls for immediate treatment, with a view to check the process at the outset. As a general indication, any tendency to bed-sores is an additional reason for general stimulation, and for redoubling our efforts to support the patient's system by food, wine, brandy, and medicinal stimulants. Every effort must be made to save the affected parts from pressure, as by turning the patient on his side if the sacrum or nates be threatened. The ring-shaped elastic cushion is also an excellent expedient, and in extreme cases the water-bed or the strap-bed (known as Corrigan's bed) will be found useful. Local stimulation is an excellent means, when used sufficiently early. With this view, erythematous patches occurring in suspicious situations may be washed with a strong solution of nitrate of silver (half a drachm or a drachm to the ounce), or pencilled over with the solid caustic. Camphorated lotions or turpentine may be used with a like view, mainly to stimulate and support the local vessels, and thus maintain the life of the part. When sphacelus has taken place, and the slough of dead skin and areolar tissue has fallen out, the cavity may be washed with tepid water, and stimulating dressings applied. In those cases in which fistulæ present themselves, it will be necessary to syringe them out with tepid water, once a day at least; they may be then injected with a twenty or thirty-grain solution of caustic, and afterwards stuffed with lint or charpie, saturated with some stimulant dressing. Resinous, spirituous, and vinous dressings, as well as those made with tincture of bark, were formerly much in vogue; but I know of no application so suitable or effectual as that made by mixing equal parts of the balsam of copaiba and common castor-oil. In the chronic stage of bed-sores I have known this remedy to be used with the greatest effect.

In epidemics of the worst forms of typhus, more extensive gangrenous destruction of the surface, and occasionally mortification of the extremities, have been met with. It will be very necessary to be on our guard, in order that those extensive discolorations of the surface, which result from the association of purpura hæmorrhagica with the fever, shall not be mistaken for the appearances of gangrene, a thing not improbable from the deep, livid, purplish tint which those parts assume in typhus which are the seat of extensive patches of purpura. There can be no doubt, however, of the occurrence of extensive mortification of superficial parts, as well as of the extremities, in the famine fever of Ireland. I have myself witnessed the following striking instance of death in life; it exemplifies some of the singular conditions occasionally to be met with in the typhus gravior. The patient, in the last stage of chronic starvation, and with the typhus crasis characteristically developed upon him, was yet able to walk some distance to seek admission into the workhouse hospital of his district. On baring his chest to examine him, we were shocked to perceive the whole of the superior anterior part of the right side of the chest converted into a dark olive-green, jelly-like, and tremulous mass. The condition of sphacelus in this case was the most complete and extensive I have ever seen; and, as well as could be judged, it appeared to implicate the texture of the great pectoral muscle, as well as the integument over it. There could be only one end to such a case.

Mortification affecting part of the foot or the leg may also be met with in low typhous epidemics. In these cases, there has usually been a defective condition of nutrition for some considerable period before the fever set in; and since the patient was attacked, exposure to cold in a damp unwholesome atmosphere, and upon a bed of foul and rotten straw or upon the hard floor, without covering of any kind. Most of these cases prove fatal; but if the process of mortification engages only a limited surface, the patient must not be abandoned as altogether beyond hope. Stimulants are called for in the most liberal doses, and the part or limb must be wrapped in cotton, and appropriate means used to keep up the circulation in the remaining portion of the extremity.

Glandular swellings occasionally present themselves in various parts of the body during the course of typhus, and in some instances to such an extent as to give quite a marked and special character to the case. In a minor degree we find such swellings now and then to occur in the axillæ and the groins, but as they subside after a time, and demand no medical interference, they are passed over. Some few instances are, however, on record, in which the bubonic affections assumed very formidable characters. One of the most remarkable cases of this kind I am acquainted with is that of the man Horncastle, described in Dr. Stokes' Lectures on Fever. Large and foul buboes formed in various parts, and suppurated; there was extraordinary prostration, and the amount of stimulants required to bring the patient through was enormous. The bubonic affection has likewise been noticed in the London Fever Hospital, and to so marked a degree, that a celebrated Egyptian physician, on seeing some of these cases, is stated to have declared that in Egypt they would be set down as examples of the plague.

The treatment consists in careful poulticing, opening the buboes if necessary when mature, and free general stimulation with wine, brandy, ammonia, bark, &c. Having considered, seriatim, the secondary lesions which affect the various organs in typhus, we may sum up, under the head of "bad signs," a variety of symptoms, which will be of use to the junior physician, in directing his prognosis in many cases of fever.

BAD SIGNS IN TYPHUS.

1. It is a bad sign if the typhus prostration is early developed and profound, and if the skin be dark-coloured and the extremities cold.
2. It is a bad sign if the patient cannot sleep at any period after the seventh day.
3. It is a bad sign if the patient is wakeful, delirious, and unmanageable; and the case is all but hopeless when the tartar emetic and opium plan fails to give relief in this class of affections.
4. Continuous sweats occurring between the se-

venth and twelfth day, and unattended with relief to the pyrexial state, are of unfavourable omen.

5. When there is tendency to coldness of the breath with "sunken" face and coldness of the extremities, the case must be looked upon as of very low type, and there is reason to apprehend death by asthenia.

6. When the pulse rises above 120, becoming at the same time small and thready, the state of the patient is formidable, unless stimulants are found to lower the rate and expand the volume of the pulse.

7. If there be thumping action of the heart, and feeble pulse at 130 or 140, the case is a hopeless one, unless the circulation can be controlled and strengthened by stimulants within twenty-four hours.

8. When to the last-named condition is added coldness of the breath and tongue, with cold sweat upon the surface, the patient may be considered in the majority of cases as past all hope.

9. A tendency to sighing presents itself in many patients for several days together; the patient may have no formidable secondary lesion of any kind, but is yet nervous and apprehensive about himself from the beginning; such cases not unfrequently occur in persons of the better classes, including clergymen, lawyers, and physicians. A presentiment of death often haunts individuals at other times remarkable for strength of mind; this presentiment often becomes a realised fact, by the death of the patient at an early period, and in an unexpected manner. While we take care not to betray our own suspicions, we must give the utmost attention to this class of cases, with a view to anticipate sinking by liberal stimulation and other appropriate means of treatment.*

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* No class of cases affects the medical practitioner in Ireland

10. If wine disagrees with the patient, that is to say, if it excites the heart and brain instead of tranquillising them, extreme danger must be apprehended.

11. When hiccough is present for more than twenty-four hours and becomes uncontrollable, there is little chance of saving the patient.

12. If unmanageable tympanitis exist, with or without diarrhœa, no effort will save the patient, in the majority of instances.

13. Floccitatio, or picking of the bed-clothes, is a symptom of serious import; the same is to be said of subsultus tendinum ; but neither of them is a necessarily fatal sign, though often considered so.

14. If passive bronchial effusion take place, and if stimulants and expectorants, including turpentine, fail to produce evacuation of the bronchi within a limited time, the patient must be considered *in extremis.* Extensive typhoid pneumonia gives the same indications.

15. Involuntary discharges of the urine and fæces, especially when they occur at an early period of the case, are very unfavourable, but by no means necessarily fatal symptoms.

16. Erysipelas, gangrene, and sloughs, especially if

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more than those occurring in the persons of his own brethren in the profession, and the Catholic clergy, as well as those of other denominations, who, next to the physician, share most of the perils of an epidemic of typhus. When struck down by the fever themselves, they have vividly in mind the leading symptoms of the last fatal case which they have witnessed amongst their nearest and dearest friends, or amongst their parishioners or patients. Such impressions have the worst possible influence, and depress the patient beyond measure. Some of the worst battles which the physician will have to contest with disease, are to be encountered whilst dealing with such cases.

occurring on the back, and if of a great extent, are often fatal.

There are a few incidental lesions occurring in typhus, which do not readily find a place amongst the ordinary secondary lesions. Deafness is sometimes observed in one or both ears about the middle periods of typhus. It is hard to say upon what anatomical condition it depends. It may be explained in some cases by the general thickening and turgescence of the fauces, leading to partial or complete occlusion of the Eustachian tube. In other instances it seems to be due to the swelling of the parts in the parotidæan region. Deafness is regarded by some practitioners as a favourable sign; I cannot conceive why, and I believe it to be a condition which has usually no connexion whatever with the result of the case.

Parotitis.—Inflammation of the parts in the parotidæan region occurs at the close of some cases of typhus; there is reason to think that it is not the parotid gland itself which is implicated, but one or more of the lymphatic glands imbedded in its surface. The swelling sometimes reaches to a considerable extent, and by pressing upon the external meatus of the ear becomes one cause of deafness. Abscesses are occasionally formed, and become troublesome, though otherwise insignificant sequelæ of the fever.

Symptoms of nervous irritation are occasionally presented in different parts in typhus, and give rise to nervous twitchings during the course of the fever, and after its cessation to slight semi-paralytic states in various parts of the body, which last sometimes for two or three years subsequently. This condition is sometimes found to affect the sciatic nerve of one extremity. We have known a case in which the ulnar nerve of one side was affected, both sides of the little finger and the ulnar half of the ring-finger being anæsthetic for about five years after the patient recovered from the fever.

Subsultus tendinum, or spasmodic twitchings of the muscles or tendons in the legs and arms, is a symptom always of grave, often of fatal, import; it is often most distressing, and an attendant is required to press his hands on the legs of the patient to retain them in a state of temporary tranquillity. Musk, camphor, strong broths, and free stimulation are imperatively called for in this class of case.

TREATMENT OF TYPHUS.

In undertaking the management of a case of typhus, the first and most important rule is to secure complete and absolute control over the case, and, what is perhaps of more consequence, over every one, whether relative or domestic, in attendance upon the patient. The consulting physician, when called to the sick-room of a person in typhus, often finds things in a state of utter confusion; and what between officiousness and over-anxiety to be of use, on the one hand, and insane alarm on the other, finds it difficult, if not impossible, to get a good insight into the history of the case, and its progress up to the time he first sees it. Nothing is more requisite than to establish order and regularity around the bedside of a patient in typhus, and to substitute successive watches and relays of fresh and active attendants for the wearying, exciting, and protracted night and day watchings of the over-anxious mother, wife, or sister. No doubt heroic instances will be met with from time to time of individuals combining devotion and courage with every requisite of judgment and control over their own feelings, and so insensible to the fatigues of night watching, that they will be enabled to nurse a patient successfully through a three weeks' typhus. Such instances are, however, rare, and under ordinary circumstances it is far better to have a regular alternation of night and day attendants.

Free ventilation, without draughts, must be secured in the sick-room of a typhus patient, and is a condition of great importance. It is desirable that the temperature should not pass beyond 60° at any time; and of the two, I believe excessive cold is less injurious than excessive heat in typhus. A fire need not be interdicted in winter, but the above condition —viz. an average temperature of 60° Fahr.—must be strictly attended to when practicable. The patient's bed-clothes must be sufficient and comfortable, without being too thick or heavy. It will be a good plan to do away with curtains of all kinds; and on the whole, a well-made hair-mattress, upon an iron bedstead, is far preferable to a feather-bed; it admits of the patient's linen being more easily changed, and the posterior surface of the body can be more readily examined from time to time, and attended to, if there seems any disposition to the formation of bed-sores.

Food and Drink.—It is often thought that the food and drink of the patient in typhus are subjects in which the physician has no right to meddle; and yet it is incalculable how much mischief is done in fever cases by injudicious management of the patient with respect to his ordinary food and drink. Ill effects occur in two ways: either the patient is pressed with various articles of food and drink until his stomach is surfeited; or, on the other hand, the patient is literally starved, under the impression that food will add to the inflammatory excitement which is supposed to be present. The starvation plan of treatment, based on a phlogistic pathology, has, when combined with depletion, consigned numbers to the grave. Impressed with the force of this truth, the late Dr. Graves was in the habit of saying that he wished it to be inscribed on his tomb, as his most honourable memorial, *that he had fed fevers.* In this is recognised a great practical truth: the maintenance of life supposes metamorphosis of the tissues, and metamorphosis of the tissues supposes nutrition, which in its turn requires a regular supply of aliment to the stomach. It must not be forgotten, however, that the fever patient is not in a condition to assimilate nutritious materials to the same extent as if he were in the state of health. The supply of food must therefore be of the mildest and blandest kind, while it is moderate in quantity. Broths, soups, nutritious jellies, and such like liquid aliments are useful; but I see no objection to the patient getting in moderate quantities any ordinary kind of light solid food, roast or boiled, if he chooses to ask for it; and this I have known patients occasionally to do. Indeed Stokes relates a case, at once singular and instructive, in which a delicate patient, supposed to be moribund in fever, was provoked by the savoury odour of corned beef and cabbage, which were being dressed in the kitchen, and insisted on a substantial plate or dishful being brought to her bedside. It was thought of little consequence to indulge the freak of a dying person; but, strange to say, the patient recovered straightway, despite this outrageous contempt for the rules of scholastic therapeutics. The rational conclusion from this and many similar cases is obviously that a regular supply of nutrient materials is indispensable to the maintenance of life in typhus as well as in health. We must avoid excess and repletion, on the one hand, and weakening the already low system of the patient by starvation, on the other; it is a good common-sense plan to allow the patient at the usual meal times a reasonable amount of light nutritious food. Thus, between nine and ten o'clock in the morning, let him have a cup of tea or coffee well diluted with milk, with toast; one o'clock, as the usual hour of lunch, will be a good time for giving a couple of glasses of sound wine, with a biscuit or something equally light; between three and four o'clock the patient may have something in the shape of dinner, and this may be either good strong beef-tea with toast, or occasionally a little light animal food, if the patient desires it, and is in a condition to bear it; at, or about, eight P.M. the patient may have some very light and unexciting supper, as arrow-root, and this is another excellent time for administering a couple of glasses of some cordial and sustaining wine. Now let there be no mistake as to the indications here detailed; the object is to support the system by a moderate and judicious supply of nourishment at seasonable intervals, but to avoid repletion of the stomach, on the one hand, by the slops and endless farrago of the sick room, just as much as starvation on the other. It will be found that by thus regulating the diet of the patient, we shall most readily save him from the teasing and over-anxious solicitations of friends, who are perpetually, through mistaken kindness, urging upon him food and drinks in every conceivable shape, besides fruits and condiments of various kinds, which with his medicines do not leave his stomach one unoccupied half hour in the day. The state of perpetual drench in which the stomach is thus often maintained between physic and slops has the most injurious effect in many cases. While the patient can digest and assimilate a certain moderate amount of nutriment in typhus, the stomach and intestines are wholly incapable of mastering the heterogeneous ingesta thrown into them in many instances. Irritation of the gastric membrane, with gaseous distension and nausea, vomiting, and sometimes incontrollable hiccough, are but too often the consequence. In other instances tympanitis becomes the most prominent feature, and then, as already explained, we have a paralytic state of the intestines to deal with, in which there may or may not be nausea and vomiting, with ineffective irritable diarrhœa, and at the same time a passive accumulation of gases and liquids in the cavity of the abdomen.

When the patient is convalescing, the utmost care must be exercised in the choice of food, and the more solid meats, as beef and mutton, must be withheld for at least a week or ten days after convalescence has well begun. I have known the incautious use of mutton chop, which is often craved for by the patient, to produce diarrhœa, and occasionally a dysenteric attack, lasting for some weeks; this weakens the patient very much, throws him back, as the saying is, and more rarely sets up an irritative secondary fever; in exceptional cases death has ensued, with too much reason to trace the commencement of the fatal symptoms to the incautious use of solid animal diet.

Thirst.—This is often a symptom of an urgent character, and there are few cases of fever in which thirst is not a trouble to the patient, and a difficulty to the physician. It is no doubt right that a natural desire should be gratified, and nothing is more imperative and uncontrollable than the perpetual craving for drink in many cases of typhus. There is no harm in allowing the patient a moderate amount of cooling drink of almost any kind from the outset; but we must resolutely set our faces against drenching the patient with slops of every conceivable nature, and in unlimited quantity, at every moment that he calls for drink. Cold water in mouthfuls, very slowly swallowed, often allays the inordinate thirst more than deep draughts rapidly and greedily swallowed; small lumps of ice placed on the tongue, and allowed to dissolve slowly, likewise assuage thirst; subacid but well-ripened fruits, as oranges and grapes, are likewise occasionally useful; good French wines, as Claret and Burgundy, mixed or not with water, as the case may otherwise demand, are also efficacious; effervescent draughts, as soda and seltzer waters, are often grateful, and, where circumstances admit of it, French or Rhenish effervescing wines are particularly pleasing to many patients. Amongst specifics against thirst, the preparations of camphor are those most often useful; the ordinary Mistura camphoræ, in half ounce or ounce doses, may be exhibited, and often with excellent effects. Murray's fluid camphor is also of much use.

Heat of skin is occasionally one of the most intolerable symptoms in typhus. The cutaneous surface may be much relieved by careful rubbing with soft dry Turkish towels once or twice in the day; sponging the body and limbs with warm vinegar and water, if done so as to avoid the risk of chilling the patient, will be found most grateful and refreshing. The effect of this is excellent; it thoroughly cleanses the skin, and for a dry hot surface, with intense calor mordax, substitutes a softened state of the integument, with but a very moderate and quite tolerable heat for some hours subsequently.

Attention to the state of the primæ viæ is of the utmost consequence in the management of fever cases. An occasional enema of soap and water, when the action of the intestines is sluggish, will promote sleep and the general tranquillity of the patient, relieving heat of head, and even delirium and restlessness. Retention of urine, though not a very common occurrence, is one which, when neglected, may give rise to symptoms of the most alarming kind, and, if allowed to continue unrelieved till too late, may be the direct and sole cause of a fatal issue in a case which otherwise would in all probability end favourably. Thus I have known of an instance in which a patient, a female, on the seventeenth or eighteenth day of fever, was in a moribund condition after protracted convulsions verging into coma from the ignorance or neglect of her attendant (a homœopathic practitioner). Another opinion (that of Dr. Corrigan) was sought when the case was *in extremis*, and then only was it ascertained that the bladder was distended to above the umbilicus; the catheter drew off a bucketful of most foul and putrid urine, and the patient recovered with the sequel of a chronic cystitis, which lasted some three or four months.

Both in private practice, and in patients presenting themselves in hospital, cases are often met with which, so to speak, have been "*spoiled*" from the outset. Under the mistaken impression that an abortive action may be induced in the fever, various specific plans of treatment are still in vogue. Thus, one practitioner supposes that he can prevent his cases running on into regular typhus by vomiting them, another by purging them, or depleting them from the outset. Any of these processes may have a most decided and unfavourable influence over the patient's chances of recovery. This is especially true of the plan of treatment by emetics and purgatives.

Physic.—As a general rule, it may be said that physic is to be avoided in typhus, unless and until it is clearly required, and then it should be administered with well-defined purpose. Common sense seems the best guide in these cases; and yet there is often great difficulty in satisfying the expectations and requirements of friends, unless the physician seems to be actively physicking his patient from the beginning to the end of the case. A little moral courage and firmness, if based on real pathological knowledge, will, however, usually overcome difficulties of this kind.

From the views that we have inculcated throughout of the pathology of fever, it is hardly necessary to say that no specific plan of treatment in typhus will be here recommended. We have no faith in efforts to cut short the fever; we cannot advise emetics for the purpose of causing the fever to abort; we cannot propose to ourselves to sweat the patient out of his fever; nor can we hope to effect the same object by purgatives or diuretics. What then, it may be asked, is the duty of the physician at the bedside of a patient in typhus? Is he to stand idle, and wait till this or that striking symptom calls for his interference? Certainly not; he knows from experience that the tendency of the disease is for the patient to sink, and, as it were, for life to go out by a gradual process of extinction of the vital powers. He is then to anticipate by every means within his power this tendency to sink. He must in fact feed, support, stimulate, and so far, as well as in other ways more distinctly medical, treat the case while it is under the influence of the disease, as to make it live through the period of the fever if possible. He is in the position of the captain of a ship, who skilfully makes his vessel ride out the storm, not by any one specific mode of action, but by a combination of skill, intrepidity, and readiness, which enables him to see at once every possible source of danger, and use every means at his command to obviate it. This may be looked upon as the first great cardinal rule in the management of fever.

While feeding, supporting, and stimulating his patient, the physician must be for ever on the watch for the several local complications which so often, as we have seen, present themselves incidentally in the course of typhus, invading now this organ, now that. He must be prepared to anticipate these affections, and must make it a part of his daily duty to examine with care the various important organs, as those of the head, chest, and abdomen. And while he carries out the all-important indications already given as to feeding, supporting, and stimulating the patient, he must be prepared to act boldly, as experience dictates to be best and safest, with regard to the local secondary affections before enumerated. Thus it may happen that while he is obliged, by the presence of a typhoid pneumonia, to abstract some ounces of blood by cupping from the chest, he is at the same time called upon to stimulate his patient's system by an unlimited supply of wine, or it may be stronger stimulants, which may afford the only possible chance of saving life.

At the outset of typhus there is, in some cases, such an amount of pyrexial re-action, as to indicate the employment of the ordinary febrifuge remedies. Indeed, if given with caution, diaphoretics are useful in a good many cases during the first week; they must not, however, be pushed to the extent of producing excessive sweat, or in any way weakening or lowering the system. The acetate of ammonia or the citrate of ammonia given in effervescence will be often found grateful. The Pulvis Jacobi veri and the ordinary Pulvis antimonialis are also safe if given in moderate doses. Tartar emetic is not, in my opinion, either a safe or advisable remedy in typhus. We must bear in mind that we have to deal with an extremely prostrate state of the circulation, over which we know antimony to have much depressing power. All medicines of the diaphoretic class must be used with the greatest possible caution in typhus.

We have so constantly alluded to the question of venesection in typhus, that it is only necessary to enter our protest against it here formally once more. In saying this, I am perfectly well aware that some few physicians still pursue the practice of bleeding in typhus; but as once forcibly remarked to me by

Stokes, it only proves how hard it is to kill some people.

Under the head of *periodics*, preparations of bark have been used in typhus, but the indications are neither so clear nor so successful for the use of these drugs in typhus as in other types of fever. While then we cannot say that the decoction or tincture of bark, or the sulphate of quinine, is very clearly indicated for the treatment of the typhous group of fevers, there are many cases undoubtedly in which cinchona or quina will be found of use. In general it may be said that bark, in any form, constitutes the best and simplest medicament which can be employed in those cases in which there is no secondary complication, and when no positive indication for specific treatment exists. Now in many of such cases, with a view to the moral effect upon the patient himself, as well as for the satisfaction of friends, it is desirable that some medicine should be administered at stated intervals. This expedient is not only a justifiable but a necessary one: it establishes order, maintains confidence, and, where such a medicine as quinine is used, is of positive service to the patient.

We will now suppose a case of fever, under judicious management, progressing to the seventh or eighth day: bland nutritious food has been supplied at regular periods; every attention has been paid to the state of the primæ viæ; the pulse, the tongue, and the skin have been carefully watched; and there is as yet nothing about the case to indicate positive danger, or to call for active interference on the part of the physician. In the hands of an experienced practitioner, a case such as we have just indicated will, in all probability, be brought to a favourable issue; on the contrary, in the hands of a rash and inexperienced practitioner, the events of the next three days may bring the patient to death's door, and in many such instances, life is lost. The fundamental difference in the two cases will be found to be this: that in the former case, the natural tendency to sinking and collapse which characterises the fever has been anticipated; in the latter, no precautions have been taken against the tendency to sink at this period of the fever; and it may be, and often is, the case, that the treatment pursued, whether by purgatives or diuretics, or again by general depletion, has hurried on the fatal issue. It is precisely at this period, between the seventh and tenth day, when the symptoms present give an all but negative result, that the experience of the practical physician who has seen much of typhus is of such value to his patient. This is the period when a moderate amount of stimulation and moderate nutriment, exhibited by a bold but skilful hand, prevent the patient from passing into the typhous collapse, so often fatal both in endemic and epidemic visitations.

It is extremely difficult to lay down any definite rules of treatment for cases just at this period. In general, however, it may be said that it is both safe and judicious practice to exhibit wine (in small quantities at first) on the seventh or eighth day of the disease. It requires the nicest judgment in these cases to determine how far we may go with stimulation. It is of less consequence to the patient, however, in most cases to err by giving wine too early or in excessive quantity than to defer it too long. It is the safer plan, therefore, to administer a few ounces of wine, experimentally as it were, during the first day. If no excitement of the pulse or heart be produced, the stimulant may be kept up, for we must bear in mind that prostration and sinking are the general characteristics of the disease. In some cases wine given even in small quantities excites the heart and pulse, and in such instances it is rarely beneficial. As we have before shown, if cerebral excitement and the dry baked condition of the tongue are produced by wine, it is worse than useless to continue its exhibition. The seventh day may be taken as that on which we may commence the stimulant plan of treatment, cautiously, as before remarked, and as it were experimentally; but I believe it would be better to run the risk of stimulants disagreeing in a few cases, than in the majority to allow the prostrating efforts of the disease to steal a march upon us.

It is impossible to state what quantity of wine will be required in different cases, but we may commence with from three to six ounces as a general rule. In private practice, and in families where we know the cost of wines is not a matter of consideration, the higher class of French wines may be used with great advantage in the first and second weeks of typhus; they produce an exhilarating effect without exciting the heart or brain. Lafitte and Chateau Margaux are excellent for this purpose; Volnay or Chambertin are suitable where a more considerable effect from wine is desirable, as these Burgundy wines have greater body and strength than those of the Claret vintages. Sherry and Madeira are useful, and must be employed where early sinking is imminent. Port answers the same purpose, but is heavier on the stomach. The effervescent wines, whether French or

Rhenish, are very refreshing, and especially useful where thirst is much complained of.

In hospital practice our means are of course much more limited, and we must be content with sherry or port; whiskey and water may often well supply the place of any wine, and when sinking seems imminent, hot whiskey or brandy punch forms one of the best and most effective stimulants. When the case is *in extremis*, the best wine is but a poor substitute for sound brandy or whiskey punch, which must be given *ad libitum.* But the great secret in reference to stimulants is, I believe, not so much to give them in large quantities when the patient is in extreme danger, as to anticipate sinking by the timely administration of wine or brandy. It is therefore a safe rule to commence the use of some stimulant on or about the seventh day, being guided by the nature of the case as to what class of stimulant we shall select. There are many memorable cases on record, which prove the extraordinary tolerance of stimulants in fever; the case of one patient, given by Stokes, cannot be easily paralleled. Within twenty-one days he consumed twenty-four bottles of wine, besides which he used six bottles of brandy, a quantity sufficient to keep another individual in a state of permanent intoxication, but which had only the effect in him of keeping the system up to par, without ever producing the slightest approach to intoxication. In the exhibition of wine, the state of the tongue, the pulse, and the heart, constitutes our chief guide as to whether the case is improving under its use, or the contrary. Thus if the tongue becomes moist, moderate in volume, and steady when protruded, without tremulousness, it is all but certain the exhibition of wine is agreeing with the patient. If, on the other hand, the tongue becomes dry, crusted, and tremulous, the chances are that wine will not do in such a case.

We have already fully considered the indications furnished by the pulse and heart.

Where wine fails, or shows a tendency to excite the brain and nerves, ethereal preparations will sometimes be borne with good effect. The nitric, sulphuric, or chloric ether may be exhibited in any simple vehicle, in doses of twenty to sixty drops. Carbonate of ammonia or the aromatic spirits of ammonia may be given for the same purpose. But as carbonate of ammonia has a purgative effect in some cases, its exhibition must be watched carefully. It is, as before stated, an excellent addition to the senega mixture, where no irritation of the bowels exists.

Musk and camphor are remedies of some value where depression with nervous excitement exists; musk may be given in from two to ten grain doses, and is often highly efficacious. It is well suited for patients of high nervous temperament, and in the incipient periods of what we have called the *delirium tremens of typhus.* Its expense is the only objection to its use. The fluid camphor is also an excellent remedy, and it is often useful in cases of delirium such as we have described, as well as in others where nausea prevails to any extent.

In a complicated case of typhus at an advanced stage, the junior physician is often at a loss to know whether stimulants are acting favourably, or the contrary, and whether their use should be persevered in or not. The following rules, furnished by a physician of great practical experience, will be found reliable as guides in the administration of wines to a patient in typhus fever.

1. If the tongue become more dry and baked, it generally does harm; if it become moist, it generally does good.

2. If the pulse become quicker, it does harm; if it be rendered slower, it does good.

3. If the skin become hot and parched, it does harm; if it become more comfortably moist, it does good.

4. If the breathing become more hurried, it does harm; if it become more deep and slow, it does good.

5. If the patient become more and more restless, it does harm; if he become more and more tranquil, it does good.

In cases of low type and without complication, where we have a good and reliable private cellar to draw upon, the treatment may be often made to consist in great part of the liberal use of wine. If the patient has a choice it may be indulged, and to prevent his tiring of the repetition of one kind of wine constantly, we may alternate between Clarets and Burgundies on the one hand, and the Spanish and Portuguese wines on the other. In a case recently treated by myself in conjunction with a very able and accomplished physician, in the south of Ireland, and in which we had likewise the assistance of another gentleman of considerable experience, the stimulation employed was almost entirely by wine. For days together the patient had three full glasses of best pale dry sherry, three of claret (Lafitte), and three of prime old port, with some three glasses of mulled port in addition. Wine was given by night as well as by day in this instance, less frequently of course in the latter period. This case recovered.

GENERAL OBSERVATIONS.

Typhus, though in some respects so formidable a disease, is in other aspects one satisfactory to the patient and to the practitioner. The progress and duration of typhus are well defined, and if the case be not fatal, the disease is rapidly and finally extinguished, and complete convalescence is speedily brought about in the majority of instances. A latent tuberculous tendency may, it is true, be called into play just when the fever is coming to a close, but this is certainly a rare and exceptional occurrence. Inflammations in the parotidæan regions occasionally leave troublesome swellings after the fever has subsided. In other instances, bedsores may degenerate into chronic fistulæ, which require attention for a couple of months, or even a more protracted period, subsequent to the attack of fever.

With the exceptions just indicated, and making due allowance for its mortality, typhus fever is, perhaps, one of the safest diseases for the patient to have passed through. In common parlance, "*it leaves no sting behind it;*" while at the same time one attack of typhus confers a very great, though not an absolutely complete, immunity from a second attack of the disease. Instances do occur, however, in which the same individual suffers from a second, or even a third attack of the disease, but they are of most extreme rarity. The constitution often seems to undergo a renovation; when the patient has passed through typhus, he will be observed to become more robust, and this as well in the case of adults as in the young of both sexes. In some cases there is a decided tendency to obesity after the fever, and in youths the process of growth is often accelerated. So far, then, from the system being impaired by an attack of typhus, I believe that the life of a patient who has passed through this disease in its pure form is of improved commercial value, and ought to be insured upon favourable terms. I know of but one unpleasant consequence resulting from typhus, — I allude to the occasional falling off of the hair during and subsequent to convalescence. It grows well again in some cases, but most often it fails to be reproduced as abundantly as before. Having this result in view, I believe it would be better to shorten the hair by careful cutting, whether in males or females, at the commencement of the second week of the fever. If required by the state of the head or cerebral organs, the hair may be cut close or shaved without much scruple, knowing as we do that it will eventually fall out. We have no right, however, to make hasty and inconsiderate orders for the shaving of the head, till we are satisfied that it is a necessary step. We may here remark on the singular tendency to the development of lice, in extraordinary multitudes, on the hair of the head and other parts of the body in cases of typhus; and this in individuals of the most scrupulously delicate and cleanly habits. The powdered *Stavis agria* is of use in destroying these vermin; it may be sprinkled through the hair pretty thickly for the purpose. Mercurial inunction is also fatal to them, but the head must be shaved in some cases before they can be entirely got rid of. Do what we will, however, their vitality cannot in some instances be destroyed while the fever lasts, but on its cessation they gradually disappear.

With respect to the question of *contagion* in typhus, I have much difficulty in expressing myself. It would be idle to look to contagion for the origin and propagation of the wide spread epidemics of typhus which have so largely decimated these countries. Whether personal contagion be possible in typhus under a system of perfect ventilation, I am not prepared to say. But I can have no manner of doubt that under existing conditions, as found in the sick room in private, or in the wards of an hospital, the vitiated atmosphere which surrounds the typhus patient is capable of generating the same disease in those previously in perfect health.

The mortality in typhus is very formidable, being not less than one in three in most of the Irish epidemics, and sometimes higher. As a general rule, the mortality seems greater amongst intemperate persons than amongst those of well-regulated habits; it is also greater amongst the upper classes in proportion to the number of those attacked, and in males than in females. Age, however, seems to have an important influence in this last respect. In young persons of both sexes, *under* twenty years of age, the mortality in typhus seems the same in males as in females. In persons *above* twenty years of age, nearly twice as many males die as females.

Typhus has been from the earliest times a formidable disease in Ireland; and in the works of Rutty, Rogers, O'Connor, M'Bride and others, very excellent descriptions of typhus cases may be read, showing an extraordinary similarity to the cases we now daily meet with.

wholly apyrexial, of one or more days, or it may be of one or several weeks' duration between them. It is in all respects a disease of a very formidable nature, producing lesions which profoundly impair vital organs, inducing organic changes of a permanent kind, and implicating life, either immediately or remotely, in a large number of cases. It may kill in the acute stage by the force of the fever exhausting the system, by perforation of the peritoneum and its consequences, by sphacelus of the intestine itself, by hæmorrhage, wasting and protracted diarrhœa, or finally by its extraordinary power of calling into play certain dyscrasiæ previously dormant in the system. The designation "typhoid" has been applied to this fever from the resemblance which it undoubtedly has in its more superficial characters to typhus. There is prostration of nervous and muscular power from the outset, though hardly ever, if at all, to the same extent at so early a period in typhoid as in typhus; there is in both the peculiar *hebetudo typhosa*, that state of dull, passive, semi-consciousness, without cerebral lesion or actual suspension of the mental faculties; dorsal decubitus, semi-consciousness, more or less well-marked lividity of the skin, an eruption on the surface, and the *typhous* aspect of the face are present in both, yet not so strongly defined in the typhoid as in the typhus, nor observable at so early a period in the former as in the latter. Indeed in many cases of typhoid, though headache is present, the intellect remains undisturbed, and the patient is fully conscious throughout.

Practical men cannot have failed to remark that there is a common expression of the face in the typhous types of disease, by which they can be immediately recognised; it may be designated the *facies typhosa*, and it is as well defined, and as easily recognisable as the *facies Hippocratica*. As we have already seen, the facies typhosa, and many of its accompanying symptoms, may be present in the following pathological states: the typhus proper, or maculated or Irish typhus; the typhoid, or enteric fever; the cholera typhoid, or that state of typhoid pyrexial action which so often supervenes in certain cholera epidemics after the proper cholera period, with its algid phenomena and diarrhœa and vomiting, has passed by; the states known as typhoid pneumonia, and typhoid bronchitis; and the more rare condition, typhoid pleuritis, a so-called typhoid state, which supervenes occasionally, in bad forms of erysipelas, measles, scarlatina, and small-pox; and, lastly, in certain cases, as the result of mechanical injuries, and as a sequel to surgical operations, typhosis becomes developed; in other not well defined states also, a typhoid condition is occasionally found to supervene; but the foregoing are those of chief practical importance.

Typhoid or enteric fever commences, as we have before stated, insidiously; after a period of malaise, with more or less disturbance of the intellectual energies, there may be rigors, pain in the head and back, with or without gastric and intestinal symptoms. It is quite common, however, to find that the case progresses without any symptoms indicative of the mischief which is about to affect the abdominal organs. This is, in fact, one of the most deceptive features in the disease; diarrhœa, with mucous irritation, heat and distress in the abdomen, pain localised in such situations as the ileo-cœcal region, with gurgling on pressure, and subsequently meteorism or gaseous distension of the abdomen, are phenomena which we should expect to find constant in cases in which there is organic lesion of the intestinal apparatus. It is no doubt common enough to find symptom and lesion associated together and progressing *pari passu;* but what seems to be not sufficiently understood is that, in very many instances at all events, the follicular lesions will be found far in advance of the general symptoms, and even in certain cases the symptoms shall be so entirely in abeyance, that the nature of the case remains undetected till post-mortem examination reveal an advanced condition of disease in the intestines.

The typhous state is usually developed by the fourth or fifth day; the *facies typhosa* is recognisable by this period, and so far it will be plain to any physician of ordinary experience that the case is one which falls under the typhous group, and the diagnosis is narrowed to the question, whether the patient is about to pass through a maculated typhus, or, on the other hand, to encounter the still more formidable dangers of a typhoid attack, and the enteric complications which follow in its train. Where diarrhœa, with a hot and swollen state of the abdomen, and anxiety, distress, or positive pain on pressure, are manifested from the outset of the case, or within the first week, and more especially when this set of symptoms is unrelieved by appropriate treatment, but on the contrary seems to have become more aggravated as the case progresses, the most passive observer can hardly fail to have his suspicions awakened, if he possesses the requisite knowledge of the pathology of fever. With the *facies typhosa*, the abdominal symptoms above enumerated define the nature of the case with almost perfect certainty, even before the appearance of any characteristic eruption.

Typhoid fever, like typhus, presents so commonly a cutaneous eruption, that we must regard it as a main feature of the disease, though it is neither a necessary nor an absolutely constant one.

The period at which the eruption makes its appearance in typhoid is not so well defined as in typhus: the maculæ, as we have seen, are usually visible between the fifth and seventh day in typhus; from the eighth to the twelfth day we may expect the eruption in typhoid. It appears in the form of rose-coloured, elliptical, or lenticular spots, very sparsely disseminated on the surface of the abdomen, chest, neck, and rarely on the face or extremities. These spots, constituting the *taches roses lenticulaires* of the French authors, appear in successive crops, each lasting for about three days; the total period during which the eruption remains visible is very uncertain; it may last a week, seldom passes ten days from the date of its first appearance; and it is often so indistinct after the first two or three days that the spots are with great difficulty recognised.

The rose-coloured spots of typhoid are readily distinguished from the maculæ of typhus by attention to the following characters:—the rose-coloured spots are extremely sparse, and may not exceed from a dozen to twenty on the whole anterior part of the trunk: it is rare that a hand's-breadth of the abdomen contains more than two or three of them; in typhus the same amount of surface may contain a hundred maculæ. The rose-coloured spots are of more perfectly defined size and form than the maculæ of typhus; the latter are very variable in size, the former (the rose spots of typhoid) are generally about one line in their long diameter, and about half that measurement in their short axis; they are uniformly elevated above the surface, neither acuminated nor flattened on their summits; their colour is generally of a somewhat rosy tint, seldom if ever of the dusky and livid hue of the typhus maculæ. Both kinds of spots disappear on pressure, reappearing instantly when the pressure is removed.

In a case of fever presenting any of the phenomena of the typhous state (*facies typhosa*), the utmost caution and discretion must be exercised during the first week in respect to both diagnosis and treatment. In the absence of characteristic abdominal symptoms, and before the appearance of an eruption, we are absolutely without the means of forming a logical conclusion as to the nature of the case. Hasty diagnosis and prognosis are liable to lead us into serious error at this period, if we make light of a case at the outset, which in a few days belies our expectations, and perhaps our opinions, too incautiously formed and expressed, by a fatal issue from hæmorrhage, perforation, sphacelus, or any of the other accidents for which a latent enteric lesion may be preparing the way. No class of cases admits so readily of being "spoiled," and getting perhaps a fatal tendency impressed upon it by the *nimia diligentia medici*, than a typhoid fever at the period in question.

The skin usually maintains throughout a more vivid tint in typhoid than in typhus; it wants the clear tint of health, but there is not the blue and livid discolouration so characteristic of the maculated fever. The temperature varies with the pyrexial tension of the system, and in general may be considered to be somewhat above that of typhus by a degree or more, and below that of the sthenic fevers to the same extent; it averages from 100° to 102° and 103°; dryness of skin with calor mordax frequently are prominent features in the earlier periods; in the more advanced stages the skin is clammy, and it may be, exhibits a tendency to become cold. A remarkable observation is that now abundantly verified, of the not infrequent elevation of temperature in the abdominal parietes, sensible to the thermometer as well as the hand, and ranging above that of other parts for days in succession. This phenomenon is doubtless a direct exponent of the pathological conditions being developed in the cavity of the abdomen, to which blood is now determined in unusual quantity: the observation is not devoid of practical significance; and even in the absence of pain, or distress on pressure, or sense of internal heat and uneasiness, undue elevation of temperature in the abdominal parietes would certainly warrant the suspicion of impending mischief, and the use of well-directed but cautious means with a view to avert it. When increased heat of the abdomen is combined with localised undue action of the greater abdominal blood-vessels, as will be hereafter more fully noticed, no more special signs of approaching abdominal lesion can be desired; their significance is obvious, and upon the indications they furnish we are not alone justified, but called on to attempt derivation of blood from the overloaded intestinal surfaces by fomentations, poultices, leeching, pediluvia, and similar means.

It may appear that we have dwelt somewhat too strongly on the tendency to latent and insidious disease in the abdomen in typhoid. It is no doubt more commonly the rule to find that the specific eruptions, and the symptoms of intestinal irritation are developed sufficiently early to enable the well-educated physician to take advantage of the indications they furnish in respect to diagnosis and treatment. It is beyond all question, however, that *latent* cases of typhoid, so to speak, occur sufficiently often to render it necessary for us to exercise the utmost caution at the outset of all cases in which there is the slightest possibility that they may eventuate as typhoid, and develop intestinal lesion.

Before we enter on the special pathology of typhoid fever, it will be necessary to establish a practical distinction amongst the cases that we meet with.

(A.) The more common examples of typhoid which we meet with are undoubtedly those in which there is a development of the specific rose-coloured or lenticular spots at some period between the eighth and twelfth day of the disease. Concurrently with this, and it may be even from the very outset of the fever, symptoms of intestinal irritation, with abdominal heat, tenderness, pain on pressure, and diarrhœa more or less constant, with or without ileo-cœcal gurgling, will have been manifested in a great number of instances. In such cases it is to be understood that the intestinal lesion progresses *pari passu* with the primary fever.

(B.) In another variety of cases, — and to this form of the disease I desire especially to call attention, — the primary fever progresses for fourteen or twenty-one days, or it may be even more, with the development of the rose-coloured rash, and all the symptoms, with the exception of those directly referrible to the abdomen; slight intercurrent diarrhœa, with partial and temporary mucous irritation, may be present; but the fever progresses throughout to an apparent termination at the end of the third week, when the patient is supposed to pass into a state of final convalescence. Herein lies the especial danger of this class of cases. With the subsidence of the fever, all danger is naturally presumed to be at an end; the pulse falls to the natural standard, and a convalescence of the most deceptive kind ensues. Under these circumstances the patient is perhaps discharged from hospital; if belonging to the labouring classes, he may resume his ordinary avocations; if in military or other service, he is restored to the ordinary routine of his duties; and whether in civil or military life, in the higher or lower classes of society, he is soon re-established in the usual routine of mental or physical labour, without any restrictions or precautions as to diet or medicines. In fact, an interval now ensues which is presumed by the patient, and too often believed by the physician, to be the commencement of complete convalescence. But it is in reality, as will be afterwards seen, only a lull in the storm.

It is not to be supposed, however, that in all instances the interval just alluded to is entirely apyrexial. By the end of the third week, the patient may be much relieved from the graver symptoms of the primary fever, without actual crisis, and he may remain for days, or perhaps for even a week or more, in an ill-defined state before any new symptoms declare themselves, and yet he is unable to leave either his room or his bed. This want of perfect, and so to say, *frank* convalescence after the fever has had time enough to work out its course in the system, is in itself indicative of the true nature of the case.

We may now proceed to the detailed consideration of the lesion which gives to typhoid fever its most specific characters.

Fevers of the typhoid type are constantly, though not necessarily or invariably, found to have associated with them a certain train of pathological actions, chiefly implicating the minute glandular apparatus of the intestines, and often more remotely engaging other parts. It will be useful to take a brief summary view of the anatomical parts concerned in these changes.

The mucous surface presents, in its tract from the mouth to the anus, a minute glandular apparatus, more or less thickly studded upon it in its various parts. However modified in the several sections of the intestinal tract, the minute glandular apparatus will be found to be readily divisible into two distinct groups, namely: — the lenticular, and in some parts so-called follicular glands; and, secondly, the glands of tubular form. As examples of the former or lenticular glands, otherwise known as the solitary glands (and when clustered in groups, as in the ileum intestine, called Peyer's glands, or the patches of Peyer), we may cite those of the mucous membrane of the mouth, known as the palatal and buccal glands, which are essentially the same as those of the œsophagus, and are analogous to the lenticular glands of the stomach, sometimes known as those of Sprott Boyd. And further, they differ in no essential respect from the similar glands scattered on the surface of the large intestines.

Examined microscopically, the lenticular glands are found to consist of minute closed sacs, filled with a semi-solid, granular, and molecular matter. Their function seems to be to fill themselves gradually with this molecular matter, and when arrived at a state of repletion, to burst and discharge their contents upon the free mucous surface. The minute sac then collapses, and gives place to another, which performs a similar office, and in its turn bursts and disappears. These minute glands have been incorrectly described as constituting open, shallow, cup-shaped follicular or purse-like cavities upon the mucous surface. This, however, is only their more transient condition, and corresponds to the period after the discharge of their contents, and prior to their final collapse and disappearance.

The most important examples of this kind of gland are to be found in the buccal, œsophageal, and lenticular gastric glands (or those of Sprott Boyd). In the duodenum we find the so-called glands of Brunner, most of which answer to the same description, while the solitary and aggregated glands of the small intestine are constructed on a similar type. In the large intestine the solitary glands are still present, but they lie somewhat more deeply imbedded in the mucous membrane, and are much less readily distinguished, except when in an intumescent condition from disease. On the mucous surface of the large intestine, there may constantly be noticed a number of minute dark points or spots, usually of a blackish colour; they resemble pin-hole perforations, and are the apertures on the mucous surface through which, by a short neck, the more deeply seated little solitary glands discharge their contents into the cavity of the intestine. These minute globular glands of the colon, each with its short neck, have no imperfect resemblance in shape to the small bottles or flasks in which seltzer water is commonly sold.

At various points of the small intestine, along its convex side, and therefore opposite to the attachment of the mesentery and the entrance of the vessels, we find the minute lenticular glands aggregated into masses of irregular size and shape. Under this form they are known by the name of the anatomist who first accurately described them, as the glands or patches of Peyer. They vary much in number, in size, and in exact position on the intestinal walls in different individuals. They are rarely found at any higher point than about the commencement of the lower half of the ileum, and in this situation are not larger than a split pea. As we pass down the intestine the patches increase in size with some regularity; the upper ones tend to a circular figure, the lower to a somewhat oval or elliptical shape. From the size of a fourpenny bit or that of a sixpence, they reach to half an inch, one inch, and in the very lowest patches to about two inches or two inches and a half in their long diameter, which is usually parallel to the long axis of the alimentary tube; their short or transverse diameter is about half that of the longitudinal. One very large patch, of an irregularly circular shape, is often but not invariably found at the extreme end of the ileum intestine, and covering the iliac aspect of the ileo-colic valve. In examining the healthy intestine of the adult under forty or forty-five years of age, the solitary and aggregate glands of the small intestine, are found in a condition of moderate repletion, very slightly prominent above the general level of the mucous surface, and not very readily distinguished except by a practised eye; with the aid of a pocket lens, however, their position and figure can usually be well made out; they will be then noticed to bulge slightly through the mucous surface, being here and there studded with intestinal villi. The part which this minute glandular apparatus performs in the general economy of the alimentary tract is far from well defined. No share in the office of nutrient absorption seems readily assignable to them, and it is not improbable that they subserve an excretory function, by removing the waste elements, and effete materials of the intestinal mucous membrane, thus assisting to maintain it in the state of health. There is some reason to believe that the physiological activity of this minute glandular apparatus becomes somewhat impaired as the individual advances in life. After the forty-fifth year, or thereabouts, the solitary glands and the patches of Peyer are found in a condition of more or less marked degeneration; they no longer present to the naked eye or the magnifying lens that state of fulness and repletion of the individual glandules, whether in the solitary form or in the aggregated patches which we notice in them in earlier life; the patches are shallow, thin, often bloodless, and having somewhat of a reticulated appearance, due to the evacuation of the contents of the individual follicles. It is manifest that the period of physiological activity is passed, and with the decline of their physiological activity in a great measure ceases their power of participating in diseased processes. Hence it is, in all probability, that the ulcerative and other lesions of the intestines are comparatively rare in the fevers of persons in advanced life. It even admits of question, whether it is possible that typhoid fever can occur in association with the special intestinal lesions we are about to consider in persons past forty-five or fifty years of age. Clinical experience corresponds with the indications of physiology in this respect, for no well verified examples of typhoid fever, in persons over fifty years of age, are found on record. It is, of course, quite possible that the period of physiological activity of the intestinal glands may be continued to a more advanced period of life in individual cases, and then the period of liability to pathological lesion may be expected to be proportionately prolonged.

The second important variety of the mucous glands of the intestine are those first described by the celebrated Lieberkühn, and still known somewhat incorrectly as the *follicles* of Lieberkühn. It is now well known, however, that the glands in question, instead of being superficial cup-shaped depressions on the mucous membrane, consist of tubular prolongations, striking off nearly at right angles from the mucous surface, and penetrating to the depth of one or two lines. These tubular glands run a somewhat straight course, and remain undivided, throwing off no branches in the human subject; in other animals, as the dog, they are found branched, clustered, and constituting the *glande en grappe*, in which the primary glandular tubule throws off a number of minute stems, each with a little saccular termination, the whole mass resembling a cluster of grapes hanging by a common stem.

The tubes of Lieberkühn are found disseminated through the small and large intestines, but as they participate but little, and that only indirectly, in the pathological changes we are about to consider, it will not be necessary to pursue their consideration further.

We may here recapitulate, for clearness sake, the various forms of glandular apparatus recognisable in the mucous membrane. We may enumerate: —

In the Stomach.

1. The gastric glands of tubular shape.
2. The gastric glands of lenticular shape, constituting minute shut sacs.

In the Duodenum.

The glands of Brunner, chiefly shut sacs, but some of them tubular and grape-like.

In the Small Intestines.

1. The (so-called) follicles of Lieberkühn, consisting of tubular prolongations lined with epithelium, usually straight in the human subject, and unbranched.
2. The lenticular solitary glands, constituting shut sacs.
3. The Patches of Peyer, or the agminated glands, and consisting of more or less clearly defined groups or clusters of solitary follicles, identical with those last described.

In the Large Intestines.

1. The (so-called) Lieberkühn follicles.
2. The solitary lenticular-shaped follicles.

It is only under certain conditions of disease that we find the glandular apparatus of the intestines thrown so prominently into relief as to enable us to recognise them on superficial inspection of the intestines. The pathological state which accompanies Asiatic cholera is that which, in my experience, best demonstrates the solitary and aggregate follicles. In this disease the mucous membrane is literally *washed*, by the copious serous exudations which take place from its surface, to a state of cleanness and purity such as it would be impossible to effect by any artificial process without entire destruction of the epithelial layer. There is usually present a more or less vivid rose-pink coloured vascularity of the whole, or greater part of the intestinal tract; upon this rose-coloured surface we find scattered, as it were, a number of minute rounded granules, occasionally of a milk white, oftener of a dirty cream colour, and thus forcibly contrasting with the rose-coloured ground upon which they seem disseminated; the whole has the appearance of a pink surface with a number of small whitish bodies, such as sago grains, thickly strewn upon it, and here and there aggregated into thick close clusters of an inch or more in diameter. The pathological state present is that of infarction of the solitary and aggregated glands, with a creamy exudation; and this I have myself ventured to designate as *the sago-grain condition* of the intestinal glands in cholera.

In other states, likewise, as in the so-called Follicular Enteritis, and in the typhoid states presently to be considered, we find the solitary and aggregate glands very prominent above the surface; but the general colouration is of almost uniform character, and they are consequently not so strikingly visible as when filled with a whitish or cream-coloured exudation, which as we have just noticed is the case in cholera.

The solitary and aggregated glands (patches of Peyer) are, as we before intimated, those chiefly and primarily engaged in the typhoid lesions. Rokitansky, who has studied and developed the pathology of this lesion with his usual profoundness, recognises four distinct periods or stages in the follicular lesion, to which my experience warrants me in adding three more.

1. The congestive stage.
2. The stage of typhoid infiltration, or stage of crude deposit.
3. The stage of softening and rejection of the typhoid matter.
4. The stage of genuine typhoid ulceration, with or without its direct consequences, such as perforation, peritonitis, &c.
5. The stage of sphacelus of one or more of the patches of Peyer.
6. The stage of healing of the typhoid ulcer, in which a process of cicatrisation is established, and which is the most important, as it is the most favourable of the conditions which may ensue after the evacuation of the typhoid matter.
7. In cases not fatal from typhoid in the early periods, a slow process of atrophy of the intestines is sometimes brought about, with thinning and wasting of the mucous tissue, filling up and final disappearance of the tubes of Lieberkühn, and the production in the end of a kind of parchment-like state of the mucous membrane, in which it has lost many of its physiological properties, and its vessels and glands are no longer able to carry on the process of alimentation

except in the most incomplete and imperfect manner. In such cases, the patients live on sometimes for a considerable period of time, becoming gradually more and more worn and emaciated, with dry and furfuraceous (branny) skin ; tubercular and other dyscrasic states are induced in the end, and the patient finally sinks a victim to cachectic disease, invading almost all the tissues and organs of his body.

We shall now proceed to study the several conditions just enumerated, taking them first in their anatomico-pathological relations, and then endeavouring to develop the various clinical characters by which they may be recognised during life.

When opportunity offers for post-mortem examination of cases of typhoid fatal during the congestive stage, we find an increase of vascularity often amounting to great congestion in the general peritoneal surface, on the exterior of the small intestines, in the mesentery, occasionally in the omentum, and in the spleen.

There is often a state of great intestinal congestion, to the extent of producing a uniform bluish black discoloration of the small intestines, sometimes extending throughout their entire tract, and manifesting itself on both the serous and the mucous surfaces. That there is a large excess of blood determined to the abdominal organs and the jejunum and ileum intestines especially, in these cases, is unquestionable.

Extensive congestion of the mesentery and mesenteric glands, is likewise often noticed ; the glands are apparently swollen, and on section exude dark venous blood in large quantity.

On the internal aspect of the intestines we may observe a similar state of general intense vascularity ;

in some instances the whole mucous surface is of a deep bluish red tint. In other instances we may note patches of vascularity specially determined to the site of particular sets of the solitary follicles and the agminated glands. Thus in some places arborescent vascular rings will be found to surround independent solitary follicles; in other parts larger vascular rings will be observed to embrace a group of Peyer's glands, throwing a vascular net-work into and through and across the patches. Occasionally large irregular oblong patches of vascularity will be found to occur in parts of the intestine next the seat of Peyer's glands; they may embrace a couple of inches or more of the intestine, and are the result of determination of blood to the included group of solitary follicles.

We find abundant evidence in these cases of an excessive determination of blood to the intestinal surfaces, and also to the peritoneal cavity generally. It is only the states last described which are the result of an active hyperæmia, and which are effective in the production of the further changes in the glandular apparatus of the alimentary canal. The sensations of heat and distress in the abdomen, with, not infrequently, excessive action of the abdominal aorta, presented during life, may be supposed to accompany the states of congestion and hyperæmia above described. And we are here furnished with indications both for derivative measures, such as leeching, poulticing, and warm fomentations to the abdomen, and for the *quædam vitanda*, including the use of purgatives, and stimulant or irritating aliments of all kinds.

The stage of congestion is naturally followed by that of typhoid infiltration of the glandular apparatus.

The period at which infiltration of the minute glands of the intestine supervenes is not well defined. It appears to occur oftenest within the first week or ten days from the outset of the fever; but it may take place at a much later stage. When the infiltration has advanced to a certain extent, we observe the solitary and agminate glands (patches of Peyer) to bulge more or less prominently above the general surface of the intestine, having at the same time a dark, occasionally reddish, aspect. The amount of infiltration, and its consistence and colour, vary much in different cases. Thus we may find the solitary glands here and there from half a line to a line in diameter, almost the size of small shot; in other instances, or perhaps in other parts of the intestine in the same case, they are of the size of small peas; and as an example of extreme infarction, we occasionally meet with cases in which several of the solitary glands will be of the dimensions of a moderate sized bean. The patches of Peyer are usually correspondingly affected, and present themselves as oval elevated masses of variable thickness,—one-sixteenth, one-eighth, or even one-quarter of an inch above the level of the contiguous membrane. The following case well exemplifies the conditions just referred to. The patient, a soldier in the army of the East during the late Crimean war, had had what was described as "a short fever;" this was succeeded by a second febrile attack, which terminated fatally by the eighth or ninth day. The intestines were found deeply congested, and, together with the mesentery, presented a general bluish red colour. The ileum was chiefly engaged, and more especially in its lower half. Some of the upper solitary and agminate glands were a little prominent and swollen. These characters became gradually more developed towards the termination of the ileum; in the lower third the solitary glands were immensely enlarged, very prominent above the surface, conical in shape, and many of them as large as the biggest peas, being of a mixed reddish and yellowish colour. The lower patches of Peyer were from an eighth to a quarter of an inch prominent, of a deep brown red colour, and their individual glandulæ were much swollen; some of the glands of the colon likewise were engaged. On section the tumid follicles of the ileum presented the same mixed reddish and yellowish colour; their contents were of pretty firm consistence, and nowhere showed any commencement of a softening process. The mesenteric glands were greatly enlarged, some to the size of kidney beans, and deeply congested, freely exuding dark blood on section.

This may perhaps be looked upon as an extreme case of glandular infarction with the secondary typhoid deposit, proving fatal from the impression on the system made by the pyrexia itself, and before any effort had been set up to eliminate the deposit; consequently no eliminative action was to be looked for, nor did any such exist. It is of course not to be expected that the deposit ordinarily exists to the extent above described.

The nature of the typhoid deposit, the so-called *massa typhosa*, has been the subject of much discussion amongst pathologists. Its microscopic characters, however, prove it to be an exudation of extremely low type, and entirely incapable of undergoing any process of cell-formation. Under a high magnifying power the typhoid deposit is seen to present innumerable minute molecules and granules, and some bodies having the appearance of imperfectly developed nuclei.

It is extremely difficult, if not impossible, to define with precision the periods during which the state of intumescence and typhoid infarction of the minute glandular apparatus of the intestines may exist without proceeding to ulceration. I have had opportunities of observing remarkable cases, in which complex processes of disease seem to have extended over several months without the typhoid deposit undergoing evacuation, and without any ulcerative action being set up in the intestines. In one instance *, in which sudden death took place from the rupture of an aneurism, towards the end of the second month from the first attack of fever, Peyer's patches were found remarkably tumified, but the deposit was not uniformly disseminated through the individual gland patches. Thus towards its extremities, and in irregular little masses in its centre, a patch would be found to present groups of its individual gland vesicles excessively distended with milky contents. Other portions of the same patch were found completely bare, numerous little vesicular cavities seeming empty and collapsed.

Protracted duration of deposit without ulceration. —Death has not infrequently occurred at advanced but very variable periods after the primary fever, in cases which on post-mortem examination have been found to show a still comparatively early and immature condition of the secondary deposit. In this class of cases I have generally found the morbid appearances to be chiefly confined to the ileum, and most commonly the lower part only of this intestine was engaged; more or less extensive congestion of a dark livid colour existing throughout the mucous membrane of this intestine, and being visible both on the peritoneal and the mucous surfaces. The solitary follicles and the patches of Peyer were found in a state of active turgescence, partly from exudation into the follicles, and partly from much increased vascularity in and around individual follicles and patches. The infiltration in this kind of case was found to vary a good deal in appearance; it was sometimes of a creamy or dirty whitish colour, while in other instances it was of a dark brownish tint. In this stage it was generally pretty consistent, and showed no disposition to soften or break up; consequently no traces of ulceration were any where visible. The deposit was found on examination under the microscope to consist of minute imperfect cells or nuclei, with granular and molecular matter in large proportion.

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* See Report (Blue Book) on Diseases of the Army of the East, p. 81.

We have met with not a few instances in which the follicular glands of the colon participated in the condition presented by those of the ileum. The mucous surface of this intestine has been found dotted over in a very remarkable manner with the minute dark orifices leading to the solitary vesicular glands. For the most part these little organs were in a state of intumescence, felt hard under the finger, and on microscopic examination were found to be filled with an exudation consisting chiefly of very fine minute imperfect cells and granular matter.

There is reason to believe that in many of these cases the typhoid action had been pretty generally diffused in the system, though it had not advanced in what may be termed its seat of election, namely, the follicular glandular apparatus of the intestine, to a very marked degree. Thus though the deposit in the solitary and aggregate glands had not proceeded beyond the conditions of infarction and intumescence just noticed, we have in many instances found typhoid deposit to a considerable extent in the mesenteric glands, the spleen, the kidneys, and in some instances in the lungs.

Other secondary lesions in cases with non-ulcerative deposit. Mesenteric glands.—Enlargement of the mesenteric glands, as will be subsequently noticed, is so commonly found on a post-mortem examination in typhoid cases, that it is deprived of at least some of the pathological interest it might otherwise have in these cases. In typhoid cases in general it may be said these glands are invariably enlarged; sometimes they are increased in size to three or four times their ordinary volume. They are usually deeply injected, highly vascular on section, and occasionally softened within.

Spleen.—In some few instances of the class of cases now under consideration (infarction of the follicular intestinal glands, but without ulceration), deposit has been found in the spleen. More commonly in this stage the changes in this viscus have been confined to enlargement and increased vascularity, with a deep mulberry tint, and pulpy consistence of its texture.

Kidneys.—In the kidneys, increase in size and vascularity, with friability of the renal texture, has been commonly produced, even thus early.

Lungs.—In the thorax, engorgement, with friability of the substance of the lungs, extensive bronchial affections, and sometimes actual exudation into the pulmonary texture, have accompanied the intumescent and non-ulcerative state of the solitary and aggregate glands of the intestine.

In these cases, the exudation into the lung has been very different in character from that of ordinary inflammatory origin. It has been soft, sometimes of a dirty, half gelatinous, half grumous, material. There has been no uniform condensation of any of the lobes. The pulmonic texture exhibited in some places a sanguineous engorgement, with general infiltration of a bloody serum. In other cases the anterior aspect of both lungs on section exhibited deposits of exudation, the site of which was indicated on the surface of the pleuræ by considerable opacity of the membrane. In the neighbouring tissue, in such instances, portions of the exuded material seemed to be passing into a gangrenous state ; in other parts pus-like exudations were here and there diffused throughout the substance of the lung. In other but somewhat similar cases, considerable pleuritic effusion existed on one or both sides. In other parts, imperfect exudations, as already noticed, were to be found ; but, neither in any one case, nor in a series of cases, does the pulmonary complication in either or both lungs, or even in contiguous parts of the same lung, usually present any uniformity of character, or anything well defined either in its nature or extent. Ill-defined pleural exudations of low type have likewise been found, usually connected with some of the forms of pulmonic engorgement just mentioned. So far the absence of special character lends support to the view which associates the pulmonic lesion in these cases with the other secondary diseased processes due to the typhoid dyscrasis.

Elimination of the deposit without ulceration:—We have seen that cases of typhoid fever may be immediately fatal during the primary pyrexial attack, from the violence and profoundness of the impression made on the system. We have also seen that, when so fatal, there may be deposit to a very large extent in the solitary and aggregated follicles.

Supposing the case to survive the first period of the fever, and that the patient is progressing with symptoms that warrant us in believing that deposit has already taken place in the glands of the intestine, it now becomes a question of the most vital moment to ask what are the possible ultimate issues of such a case? The more common tendency observable in such cases is doubtless towards softening of the deposit, and elimination of the contents of the follicles, with the supervention of an ulcerative process which attacks the site of the follicles and patches. Ulcerative action under such circumstances brings in its train dangers of the most formidable kind, including perforation of the peritoneum, and death from peritonitis, erosion of a blood vessel and death from hæmorrhage, protracted suffering from wasting diarrhœa and abdominal pains, and death after a longer or shorter period when the patient is in the last stage of marasmus.

Now it may be asked, when typhoid deposit has once taken place in the glandular apparatus of the intestines, can we look to any other means than ulceration for its elimination? I believe we shall be warranted in answering this question in the affirmative, with the necessary restriction, however, that unfortunately the mode of termination we are about to speak of cannot be considered a very usual one. It may, however, admit of very reasonable doubt whether such a termination may not possibly be more frequent when the pathology, dietetics, and therapeutics of typhoid fever are more generally understood.

In the course of very extensive pathological investigations, I have had occasion to observe not a few instances in which elimination of the typhoid deposit seemed to have taken place entirely independently of ulcerative action. Thus the minute glands and patches of Peyer have been observed in a state of partial intumescence, the deposit being, when it still remained, of a dirty milky or somewhat creamy aspect and consistence. Parts of a patch exhibited its glandular vesicles empty and collapsed, while here and there other vesicles contained the deposit in the semi-liquefied state just mentioned; melanotic spotting of the patch was noticeable in other parts, and when present, this appearance is at least presumptive evidence of previously existing morbid vascularity. When the deposit has been for a time undergoing a softening and liquefying process, we can readily understand how it may escape and be eliminated by bursting of the vesicles, which subsequently collapse and assume the appearance of little shallow pits (very much like the aggregation of the minute depressions punched on the end of a thimble), and which give rise to the so-called "reticulated appearance" of the patches of Peyer. When the deposit is brought to a suitable state by this process of liquefaction, the ordinary peristaltic action of the intestines, with the contractions of the muscular coat in successive rings, no doubt much assists the eliminative action by causing rupture of the vesicles. Lastly, it may be stated that, in well-marked cases of partial evacuation of the typhoid deposit, the most minute examination of the intestinal surface showed the total absence of any trace of ulcerative action.

The applications of these pathological results to practice are important and obvious. We are here furnished with clear indications for endeavouring to promote derivation of blood from the mucous surface, for keeping the intestines in as quiescent a condition as possible, and in respect to dietetics for avoiding the use of all but the mildest, the most bland, and the most readily assimilable and absorbable foods.

Stage of ulceration; Elimination of deposit by ulceration.—The next class of cases embraces those in which actual ulceration of the intestines has been established. The precise period requisite for the full development of the ulcerative process does not, as we have seen, admit of being definitely determined, and is probably very variable in different cases; it is possible that no two cases of the disease are alike in this respect. We have endeavoured to show that ulceration is not by any means a necessary or invariable consequence of deposit, even when very extensive and persistent for a great length of time. On the other hand, the typhoid matter seems in some instances to be capable of exciting inflammatory reaction, as it were, with extraordinary violence and at a very early period, and in some cases with the production of actual sphacelus of the parts implicated.

Deposit in the glands, with inflammation proceeding to sphacelus.—In the following cases the very advanced condition will be found to have taken place, in which the eliminative and ulcerative process was superseded by complete sphacelus, with entire destruction of the glandular textures and the intestinal walls.

I have already partially alluded to a case of the most remarkable kind, in which death took place on or about the tenth day after admission into hospital, and in all probability within twelve or at the utmost fourteen days from the first invasion of the disease. The principal effects of the morbid process were found in the abdominal cavity; throughout the ileum the most extensive ulceration of Peyer's patches existed, in some with total destruction of all the tissues of the intestines. In two or three of the lowest of the patches the sphacelus of the tissues was so complete, that after opening the intestine, the ash-coloured sloughs corresponding to the mortified gland patches became detached and fell out, long oval apertures being left in their site. Perforation had occurred (probably two or three days before death), and extensive peritonitis existed, the viscera being glued together by recent lymph. It is worth noticing the statement furnished in connection with the clinical history of this case, to the effect that the bowels were regular, and that there was no complaint of pain in the abdomen till within two or three days before death. In some few other cases I have had opportunities of witnessing this intense destructive process in the tissue of the aggregate glands, but it was usually the result of a much more chronic process of disease.*

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* Specimens of the sphacelated typhoid intestine may be inspected in the museum of Fort Pitt, Chatham, and in that of the medical school of the Catholic University of Ireland, Dublin.

Enteric ulcers.—A well-marked illustration of the chief morbid phenomena of ulcerative typhoid is presented in the following case, which occurred in the Crimea in the month of August, 1855. The patient was admitted on the 2nd, and died on the 16th. Diarrhœa was present from the first, and continued throughout; there were also much vomiting, and much nervous irritability, attended towards the close with violent and almost constant subsultus tendinum; pain and gurgling were observed in the ileo-cæcal region, and bed sores had become established already. On post-mortem examination general enlargement, prominence, and turgescence, with frequent ulceration of the solitary glands of the intestine, were found; there was also most extensive ulceration of Peyer's patches. The mesenteric glands were enlarged and much congested.

The particulars of another case are worthy of being specified. The patient (a soldier in the Crimea) had had a short febrile attack of seven or eight days' duration, from which he convalesced sufficiently to enable him to leave hospital and return to duty; but it was found necessary to readmit him in three or four days subsequently, when fever of a low type became developed. It is stated that he had bloody stools on admission, and about the tenth, eleventh, and twelfth days of his illness he was affected with diarrhœa, but without the least attempt at crisis. Thenceforward in the disease this symptom, though occasionally present, was not constant or marked, nor does it appear that there were any other symptoms of a kind to draw attention to the abdominal region. A very extensive bronchitic affection became developed subsequently, which assumed a very formidable character, and was in all probability the more direct cause of death, which occurred about the twenty-fifth day from the date of the second admission of the patient into hospital: bed-sores had formed in this case likewise previous to death.

On post-mortem examination, circumscribed pleuritis with recent lymphy exudation was found in both pleural cavities. The bronchial tubes were filled with copious viscid secretions extending throughout their minutest branches. Intense congestion was found in the abdominal cavity, both in the omentum and mesentery, and on the serous surfaces of the alimentary canal. The small intestines were deeply congested, in several places greatly contracted and presenting a quadrangular form, and in some points diminished to fully one-fourth of their natural calibre.

The ileum was much congested, and exhibited numerous deeply-eroded ulcerations, chiefly corresponding to Peyer's patches, which were completely eaten away down to the muscular coat. This was most remarkably the case in the last three or four patches, the erosion being complete down to the muscular structures, which lay bare, red and dry; the borders of these ulcerations were thick, and in some parts elevated, being also generally extremely angular and irregular. There were besides several minor erosions, corresponding to the site of the solitary glands; the intervening mucous membrane was thickened and of a dark blueish red tint. In the colon, numerous but more regular oval-shaped ulcerations were found, the mucous surface running flush to the edge of the ulcer. Towards the sigmoid flexure there was some evidence of a dysenteric process. The mesenteric glands were much enlarged, and many of them had undergone a process of cheesey softening. The kidneys, spleen, and liver were somewhat enlarged and congested, but presented no characteristic change.

These cases, few but well-marked as they are, will serve as a type of those which are not infrequently to be met with when the disease advances rapidly. It is necessary, however, to remind the reader that such changes must not be ordinarily expected at an early period of the fever. It is probable that the deposit in the follicular apparatus of the intestines occurs chiefly during the primary stages of the disease. But the changes connected with its elimination, and the consequent processes of ulceration, are not set up till a subsequent period. The occurrence of these changes is often more or less distinctly separated by an interval of time and of partial convalescence from the primary attack. A distinct re-establishment of febrile symptoms, with or without diarrhœa, and occasionally with abdominal pains and tenderness, seems to indicate and to be connected with the immediate occurrence of this ulcerative process.

We have already seen in the above example an instance of the most destructive ulceration, in some parts proceeding to actual sphacelus, which yet was known to have progressed to this condition within from twelve to fourteen days. On the other hand our tables furnish us with cases in which, from the symptoms during life—the passing of blood, and the persistence of tarry evacuations per anum—it is probable that the ulcerative process was in operation for many weeks, and in some instances for many months. In these cases, even when they had become very chronic, extensive dark and blueish red congestion was found to exist throughout the abdominal cavity, more especially observable, however, in the small intestines and their mesenteric appendages. In the ileum this condition was observable as well on the serous as on the mucous aspect. The ulcerative process was often found to engage both the solitary and the aggregate glands indiscriminately; its point of election, however, seemed to be the lower patches of Peyer. Thus, advanced ulcerations have been found in the large patch close to the ileo-colic valve, while the solitary and aggregate glands in the upper portions of the intestine were still intact.

The typhoid ulcerations of course vary much in amount, in number, in the extent of destruction of tissue they have caused, in the characters of their base and of their edges, whether thickened, or sharp, or ragged, in their colour, whether ashy, sloughlike, or of a red and irritable appearance, and in the intensity of the vascular action in their immediate neighbourhood, and in several other characters. The extent of the individual ulcerations likewise varies much; they seldom have definite shapes. Most frequently, perhaps, they exhibit an irregularly oval outline, varying from quarter, or half an inch, to an inch and a quarter, sometimes more, in the long axis of the ulcer, and quarter, half, to three-quarters of an inch in their shorter axis. The long axis of the typhoid ulcer is usually in the direction of that of the patch of Peyer involved, and therefore coincident, with that of the intestine. The most regular in form are those which present raised and thickened borders; they are somewhat circular and of the size of a shilling.

Two chief subdivisions may be made of the enteric ulcer: — 1stly. Those with sharp well-defined edges, ragged borders, more or less deep base, and in which the erosive process seems still to be in active operation; — and, 2ndly. Those in which the edges are thickened and rounded, their borders elevated, sometimes into fungating masses, and the base more or less filled in; these may be designated the circumvallate ulcers.

The final issue of the process of ulceration, which seems naturally to tend in almost all cases towards perforation of the intestine, is generally anticipated by the death of the patient, hastened in many instances, doubtless, by the co-existent pulmonic and other visceral complications. But considering the number of cases which I have had an opportunity of examining, I think it may be said that complete destruction of the tissues of the intestine to intestinal perforation is not so common as is often supposed.

Healing process in enteric ulcers. — The patches of Peyer have been found by me and Dr. Aitken, in some few instances, in a state indicating an attempt to establish a healing process. The ulcers are usually of brown colour, with extensive congestion around their margins; in the centre of the patch a small circular space will occasionally be noticed, showing the remains of an apparently healed ulcer; it will be seen to be covered over with a thin clear membrane, of pale colour, semi-transparent, and with a wrinkled and somewhat contracted border. These signs are, however, of not very usual occurrence, and care must be taken not to confound with them the ash-gray coloured slough often to be noticed at the bottom of enteric ulcers in an advanced condition.

Typhoid lesion in colon. — Evidences of the extension of the typhoid process to the colon are sufficiently often observable. As already noticed, the solitary follicles of the large intestines are often found tumid with exudation; in still more advanced cases, chiefly associated with the similar condition in the ileum, more or less extensive ulcerations have been seen in the site of these glands. When least abundant, typhoid ulcerations of the large intestines are more commonly to be found in and about the cæcum; whereas, it must be remembered, that in the dysenteric process, the seat of election of the diseased action seems to be in the lower portion of the great intestine. I have generally found that, when of limited extent, both the exudative and the ulcerative processes in dysentery are generally confined to the sigmoid flexure of the colon and the upper part of the rectum.

Other secondary lesions.—While in the cases of glandular intumescense of the intestines without ulceration, we have not infrequently met with lesions of a typhoid character in the viscera of the abdomen and the thorax, it may be stated that in the cases in which the enteric lesion has proceeded to actual ulceration, almost no instance will be found in which, on post-mortem examination, more or less extensive affections of some, and often of all these parts, do not exist. Thus lesions of the mesenteric glands, the spleen, the kidneys, and the lungs, may be said to be constant, while the liver also is sometimes engaged. Affections of the peritoneum, from the condition of circumscribed inflammation, limited to the immediate neighbourhood of an ulceration which had approached to, but not perforated, the serous membrane, to that of general sero-purulent effusion with already described in connection with the intumescent but non-ulcerated state of the solitary and aggregate glands.

Cranium.—The cranial cavity has been frequently examined by me in typhoid cases. In the advanced stages of the disease, more or less extensive congestions of all the membranes of the brain have been met with, but there has been a total absence of any special or characteristic changes. Atrophic states of the brain have been observed in chronic cases of a complicated kind.

Thorax. — It will hardly be necessary, with reference to the thoracic complications, to do more than state that they are very constantly present, and will be found to be similar to the conditions hereafter described. Extreme turgidity and congestion of the bronchial membrane, very frequently associated with capillary bronchitis, general engorgement of the pulmonary substance, more or less extensive lobular exudations and condensation of tissue, and various changes to purulent transformations in the exuded matter, are constantly presented, and seldom in an isolated form. Pleural effusions, and occasionally circumscribed pleural exudations, are to be met with in connection with these changes.

Lung infiltrations. — Infiltration of the pulmonary tissue by semi-transparent gelatinous exudation, taking somewhat the form of a miliary deposit, is often to be observed. This form of the deposit has generally resulted (1) from its having been exuded into the terminal air vesicles, or (2) because it was deposited in that form as an interstitial exudation. In the first form, the deposit for the most part consists of altered epithelial secretion, as in prolonged dysenteric cases, or in those in which the typhoid state has long existed; irregular, withered, collapsed, and compressed cells constitute the chief microscopic elements.

Softening and friability of the pulmonary texture is a very constant post-mortem state in protracted cases of typhoid fever; it is sometimes associated with exudation as a marked and well-defined deposit.

Typhoid consolidations.—In the condensation of the lung from pneumonic exudation, the pulmonary artery is generally filled with a fibrinous coagulum, extending through the minuter subdivisions of this vessel. This state is sometimes obvious only in the immediate neighbourhood of a condensed part.

The specific gravity of the lung in these forms of pneumonic exudation is occasionally as high as 1·050. The exudation of the liquor sanguinis into the pulmonary substance in the typhous states is not infrequently seen in a consistent and gelatinous-like form. Such exudations are generally confined to lobular masses of the lung, and a section through such masses presents a dirty grumous aspect, with hypostatic congestion in the posterior parts of the lower lobes. In connection with such exudations, the bronchial glands are very commonly enlarged.

The exudation in the lungs during the typhoid state is not, however, of a constant form. It is sometimes diffused generally throughout the lung, often as a miliary deposit in the ultimate air vesicles; at other times, a tolerably well-defined mass of dark brown exudation is found, varying in extent from the implication of a few lobules to that of a whole lobe, or even a still greater part of the lung. Exudations of the former type present, on sections of the lung being made, a granular appearance of a dirty grey colour; and sometimes these little masses soften into a pus-like fluid. Such exudations are for the most part found to be composed of the retained, compressed, irregular, and otherwise altered epithelial secretion of the air cells and air passages. This accumulation appears to result chiefly from the inactive and depressed state of the pulmonary function associated with the typhoid condition.

The average specific gravity of this form of the solid typhoid lung is about 1·042 to 1·043.

Friability.—The general softening and friability of the texture of the lung in the typhoid state is always associated with an engorged condition of the pulmonary tissue. This engorgement consists partly of blood, and partly of exuded bloody serum, the result of the tendency which the blood in such cases has to part with its colouring constituents and watery elements. The friable condition of the parenchyma is most marked in those non-crepitant parts which no longer contain air. The texture generally is softened, without any defined condensation, but some parts are more friable than others.

Pulmonary collapse.—A condensed state of the pulmonary substance approaching to carnification is occasionally observable in typhoid cases. This state appears to consist in an absence of air with lobular collapse. The bronchial membrane is often in these instances found intensely congested, and coated with a glairy and extremely viscid exudation which blocks up all the finer tubes.

Sloughs.—Sloughs of the pulmonary texture are not uncommon; they are sometimes symmetrical, as in cases of old standing, involving and showing themselves on the pleural surfaces, and penetrating to considerable depths in the pulmonary substance. A line of demarcation, presenting a congeries of engorged and congested minute blood-vessels, separates the dead from the living parts. In cases of acute typhoid, likewise, sloughs of the pulmonary substance are sometimes well marked, and rapidly tend to a fatal result.

Gangrene.—Exudations of the typhoid type are sometimes seen in the lungs, associated with purulent exudation in the pleural cavity, in cases where Peyer's patches are only in an intumescent state, and vascular round their borders. In such cases the pulmonary lesion has been evidently the one which led to the fatal result, and the lung often undergoes rapid changes from extensive exudations to almost complete gangrenous conditions. The broken down gangrenous matter is mixed with elements of a purulent character.

In a well-marked case of typhoid, subsequent to a dysenteric process, and prolonged over a period of more than three months, the greater part of both lungs was found to have passed into the condition of complete gangrene. This state was associated with other lesions of the abdominal viscera characteristic of the typhoid condition. In the left lung, consolidation of the upper lobe existed throughout, with partial red hepatisation. A gangrenous condition of an extensive portion of the lung was obvious through the pleural covering, and a cavity of considerable dimensions was found filled with a dirty fluid, and the fœtid débris of the pulmonary substance.

Bronchial membrane. — In severe and long-continued cases of typhoid, the bronchial membrane is generally highly vascular, much thickened, and softened.

Heart.—In cases of typhoid the heart is often flabby and soft, and its texture friable; but I have never observed the same extent of degeneration and of the "fishy" condition, such as we find to be produced in extreme cases of *typhus.*

The various affections of the solitary and aggregate glands just noticed may be summed up as follows:—

Solitary glands of ileum, and Peyer's patches.—The various states of these parts are,—1, infarction and intumescence, with different kinds of deposit; 2, softening and ejection, in various ways, of these deposits; 3, ulceration, sometimes leading rapidly to intense and complete sphacelus of whole patches of glands; in other instances, being attended with excessive fungating growths on the borders of the ulcers, reaching, in extreme cases, to a quarter of an inch in thickness; 4, several states and conditions of atrophy of both the solitary and aggregated glands, leading to collapse and final degeneration of the vesicles, with the deposit of melanotic matter as a characteristic of pre-existent and long-continued vascular action; 5, cicatrices of healed ulcers which are occasionally, but not very commonly, to be found.

The minute characters of these various deposits are:—1st, in the states of infarction and milky intumescence (well observable in cholera cases), variously metamorphosed epithelial elements; 2nd, in the typhoid cases (chiefly), minute granular, fibrinous, and imperfectly developed nuclear and minute cellular elements.

Solitary glands of colon.—Though not directly connected with typhoid, it may be not uninteresting to describe here a peculiar state of the minute glands of the colon. Small abscesses, it will be found, sometimes exist, associated with an advanced dysenteric process. The exudation having been first deposited in a solitary gland vesicle, the gland cavity became gradually distended; ultimately the exudation commenced to soften, and, combined with the condition of an increased vascularity in its vicinity, an abscess was formed, which opened upon the mucous surface through the little canal which leads from the surface to the gland. Such little abscesses freely distributed on the mucous membrane often give a peculiar character to the dysenteric process. They are sometimes arranged in symmetrical double rows through the colon, and are often associated with true dysenteric exudations; but we have met some cases in which the condition existed isolated, and I have ventured to term it "Follicular Colitis" or "Pustular Dysentery." A similar dysenteric process has not infrequently been found established in connection with the tuberculous dyscrasis. In such cases, the exudation has for the most part assumed the diphtheritic form in the first instance, the mucous membrane underneath being red, swollen, and deeply injected. The solitary glands became gradually infiltrated with exudation, and ultimately began to soften and to ulcerate, till numerous small circular ulcers were established throughout the mucous surface.

Peyer's patches.—It may be said that in no case of true typhoid fever, taking indiscriminately all those submitted to careful post-mortem examination, has a perfectly healthy state of the minute glandular apparatus of the intestines been found. Peyer's patches participate largely in the various morbid changes observed.

In the choleraic typhoid state, the patches of Peyer are generally tumid, and often loaded to excess with a remarkable whitish creamy exudation, similar to that which is found to fill the solitary follicles in the same cases. The process of elimination attempted when the patient survives for some days, appears to be the same in both these structures.

In the typhoid condition, Peyer's patches present states varying from marked and prominent intumescence of their follicles to destructive ulceration of the whole glands. They are often filled with a tawny-coloured exudation. In some cases ulceration, intumescence, and atrophy are present in one and the same case, clearly showing that the elimination of the typhoid deposit is effected in several different ways. The total destruction to complete sphacelus of the entire gland patch has been found to occur as early as about the twelfth day of the disease. The process of change is, however, in the majority of cases, very chronic.

These glands were all but invariably found affected to a greater or less extent in the sequel of the graver fevers which prevailed both in the Crimea and at Scutari.

In a case of sudden death from the rupture of aneurism into the pericardium, an opportunity was afforded of observing the condition of Peyer's patches about two months after an attack of fever.

The tumid condition of Peyer's patches was peculiar in this respect, that towards the ends of some of the patches the vesicles of the glands were excessively distended with milky contents, and little masses of the vesicles were similarly distended in the midst of the patch, the rest of the patch being completely bare and dotted over with melanotic deposit. The solitary glands of the colon were in a similar state of turgidity and intumescence. In this case there appeared good reason to believe that the elimination of the typhoid deposit in the glands had taken place without any ulcerative action, but at the expense, through atrophy, of the gland substance.

In some cases in which the dysenteric process was established subsequent to a typhoid attack, and ultimately proved fatal, it was interesting to observe the condition of the glands of the intestine as regards the progress of development or the elimination of the deposit. For the most part, Peyer's patches were found bare and atrophic, without any evidence of an ulcerative process having taken place. Towards the cæcum, however, the remains of ulceration were sometimes well marked, gland patches being found with high pulpy edges and dark grey central sloughs, the metamorphoses being generally confined to isolated portions of a patch, the remainder of which appeared either natural and full of secretion, or bare, atrophic, and worn away. In the vicinity of these patches, great congestion existed, especially around those which were the seat of ulceration. Where the sloughs had separated, a clear mucous-looking base covered the muscular layer beneath.

An intense state of intumescence prevailed in many cases of typhoid, without having gone on to ulceration, or even to softening.

The specific gravity of Peyer's patches varies greatly, according to the nature and stage of the exudation. The highest specific weight observed by us was 1·044; the lowest, 1·032.

Even in the same case, considerable latitude is to be observed in the range of the specific weights of the glands; thus, in one case, three patches were respectively 1·032, 1·036, and 1·039.

These glands present very varied chronic states. 1st. An atrophic reticulated condition, in which the gland substance is not only empty, but devoid of all glandular element. This condition may arise from the natural wearing away of the gland, or from efforts for the elimination of deposits or exudations; the process of elimination taking place, as we have reason to think it did, in some cases without ulceration, but being accompanied with the destruction of the gland vesicles. This process was observed to leave a reticulated appearance in the gland, arising from the natural interlacement of the interglandular texture around the empty cavities being rendered more prominent. 2nd. Remains of previous ulceration of the aggregated glands are sometimes obvious with various degrees of distinctness. Congested and thickly distributed blood vessels can be seen in the vicinity, or even in the gland patch itself, and mark the increased vascular action which had accompanied the morbid changes. 3rd. The follicular spaces are, in other instances, covered over on their mucous surface with a dark granular matter; the mucous membrane is in some places removed, and the openings of the follicles are bare, prominent, and patulous. 4th. In some instances, the reticulated appearance described above is the only remnant of the gland patch to indicate its former site; while, in the more obvious examples, there is a well-marked cicatrix, for the most part limited to a circular spot, in the midst of an otherwise comparatively healthy gland. This is covered over with a thin clear skin-like membrane of pale colour, and with a wrinkled contracted border. Extensive congestion exists round the margins of the patch in these cases.

Glandular atrophy of small intestines.—A remarkable condition of the mucous membrane of the small intestine, very commonly found as a result of prolonged morbid states of a complex kind, requires some special notice here.

The general appearance presented by the mucous membrane and substance of the gut in the condition referred to, is such as at once to attract attention.

Attenuation of the substance of the intestine is the most marked feature which presents itself; the mucous membrane is easily broken down, and is very friable. This condition is found to consist in an atrophy of the glandular substance of the mucous membrane.

This atrophic state was rendered apparent by thin sections of the mucous substance of the intestine made by Valentin's knife, and submitted to microscopic examination.

The regular and usually turgid follicles and tubes which compose the great body of the mucous tissue are in a condition of more or less complete atrophy or degeneration.

The tubes are irregular in form and size. They do not lie close together, but are separated from each other, and as if imbedded in a matrix composed of granular particles. Their bulbous extremities seem to have disappeared, or become encroached upon and obliterated by the fine granular fibroid-like material which now forms the chief substance of the gut; and the contents of the glands are chiefly composed of fine granular or melanotic particles.

In cases of long-continued complex disease, as

Spleen.—Considerable enlargement of the spleen with a variable amount of deposit in its substance or beneath its capsule, has been observed. In some instances the weight of the organ has reached fourteen ounces. The specific gravity of its substance was sometimes as high as 1·059. Beneath the capsule of the organ there was often an extensive deposit of yellowish soft matter. In other instances, although the spleen did not exceed from five to six ounces in weight, yet its parenchyma was irregularly condensed with exudation, and in these cases the amount of the change was best indicated by the specific and not the absolute weight of the organ; thus, with a weight not exceeding six ounces the specific gravity of the spleen in several parts varied from 1·052 to 1·059.

Kidneys.—The kidneys often exhibit very marked changes. We have found them increased by more than two volumes. In one instance they weighed respectively, the right 10 ounces, the left 8½ ounces. In another case the enlargement was still more excessive; the right was found to weigh 10½ ounces, and the left 18 ounces. The organs were soft, mottled on the surface, of a mixed red and yellowish hue, the capsule easily detached, and the cortical portion, coarse, granular, and comparatively greatly enlarged. The enlargement was generally irregular, usually, however, most considerable in the cortical substance, which was tumid and coarsely granular, often with excessive congestion of the pyramids.

On *microscopic examination* the tubuli uriniferi have been found loaded with epithelial debris.

Liver.—Changes in the liver are found to occur pretty often, but with rather variable characters. Thus it has been found soft and flabby, with marks of fatty degeneration, while both the absolute and specific weights were reduced. In one instance the weight of the organ was only 43 ounces, and its specific gravity, 1·020. In the same case the spleen weighed 14 ounces, and had a specific gravity of 1·048.

We cannot take leave of the pathological anatomy of typhoid fever, without some mention of the singular affection known as "Cholera Typhoid."

In certain epidemics of cholera, it will be found that, in a large proportion of the cases in which cholera does not prove directly fatal of itself by the violence of the disease in its first stages, a transition is observed within a shorter or longer period after the subsidence of the proper choleraic symptoms, when the patient passes into a low febrile state, which not infrequently proves fatal. This state constitutes the so-called "Cholera Typhoid."

It is not necessary to dwell in detail on the various symptoms presented by the patient under these circumstances. The appearances are those of a case of well-marked typhoid, and the *facies typhosa* is so characteristic, that by an ordinary or incautious observer the case would certainly be set down as one of typhoid or typhus fever. The abdominal symptoms of pain and distress, with diarrhœa more or less marked, and occasionally ileo-cæcal gurgling, complete the resemblance to typhoid. On post-mortem examination in fatal cases of this kind the following appearance will be noticed.

Stomach.—The condition of the mucous surface of the stomach generally varied a good deal. The colour was sometimes pinkish, indicating great increased vascularity, but this was seldom to the same extent as that to which we have found it to reach throughout the greater part of the small intestine. We have known the stomach to present features of an opposite character, the cardiac mucous surface being blackened, and in some parts emphysematous, and showing evidences of altered extravasations of blood under the mucous coat. Many of our examinations were made at a pretty early period post mortem (often within six hours); consequently the normal histolytic changes were but little advanced. This may account for our finding but very rarely the state of softening and detachment of the epithelium, and the general glairy gelatini-form softening of the mucous membrane which has been noticed by some authors. It may perhaps be as well to state here, that we are hardly disposed to attach any special importance to the conditions of the gastric mucous membrane, as observed post mortem in cases of cholera. Not only are they of the most opposite kind, but it may be fairly questioned, in some instances at least, how far they are attributable to the action of certain medicines or stimulants often very liberally employed till within a short period of death.

Duodenum. — The condition of the glands of this portion of the intestine is so subject to variety that we know not what exact value to give to the appearances which they presented in some cases of cholera brought under our notice. It may be well to state, however, that we have seen some very well-marked examples of enlargement and infarction of the glands of Brunner in cholera cases, in which a similar state prevailed to a greater or less extent throughout the remaining portion of the alimentary tract. Where these glands are most thickly set in the mucous membrane, viz., in the first inch and a half or two inches of the duodenum, the enlarged condition was most particularly obvious and remarkable.

Small intestines. — Throughout the jejunum and ileum two distinct anatomico-pathological lesions deserve notice. The first has reference to the vascular distribution in these organs; the second to certain remarkable states of their minute glandular apparatus. Under the first head we have to notice the very common, and in the cases of true Asiatic cholera, the almost constant occurrence of a uniform rose-pink coloration engaging the whole tract, but varying a good deal in intensity in different cases, as well as in different parts in the same case. It will be necessary here to bring to mind again the similar condition of vascularity found to prevail on the peritoneal surface in these cases, and which, as we have said, by its bright pink colour, offered such a contrast to the deep bluish red congestion of other parts of the intestine and also of the mesentery. This pink vascularity, so uniformly distributed on any given portion of the mucous surface, we cannot but consider as an evidence of a very active hyperæmic condition. How far this increased vascular action may be separated from a true inflammatory process we know not; but it seems to bear some very close relation to the production of one at least of the most marked phenomena of the disease, namely, the serous evacuations. It is to be observed, that the vascularity in question was not transient, nor did it admit of being removed by any amount of washing of the mucous surface.

Within this uniform pink vascularity, there occasionally co-existed more or less well-defined isolated patches of vascular injection, presenting distinct ramifications, and either surrounding certain groups of the glands or confined to portions of the valvulæ conniventes; and in this respect resembling a good deal the abnormal conditions of vascular distribution often noticed in connection with diarrhœa.

Deposit in the solitary and aggregate glands.— The condition of these structures deserves attention. In a very large number of cases, so often, indeed, that we are almost warranted in considering it as a constant character, I have observed a peculiar prominence and enlargement of the solitary glands, more especially throughout the small intestine, but to some extent in the large intestine also. In the best marked cases, the pale rose-pink surface of the whole tract of the jejunum and ileum presented the appearance of being thickly powdered over with sago grains or other similar minute white particles. The number of these little bodies increased very obviously as the termination of the ileum was approached.

This condition was sometimes, but in a much less marked degree, continued throughout the large intestine. There is nothing new in this observation, though I believe it is one to which sufficient attention has not been generally devoted. This condition of the glands has been well figured and described by my eminent friend Professor Gluge; and, since first noticed, this state of the minute glandular apparatus of the intestine has been often verified in cholera epidemics; it very constantly occurred during the prevalence of epidemics of cholera at Oran, in the Algerian campaigns of the French army; and was likewise often noticed during the Crimean campaigns.

As an important limitation to any pathognomonic significance which it might be attempted to assign to this condition, it may be worthy of note that there has been observed during the prevalence of cholera epidemics the almost constant presence of this condition of the minute glands of the alimentary tract in *all* fatal cases occurring at such a time, though in many of them cholera was not the cause of death, nor was there reason to believe that it had existed within any recent period. To some extent my own observations will confirm this statement. In reference, therefore, to its interpretation in cholera cases, we might, perhaps, be justified in concluding, that it constitutes *one*, but *one only*, of certain pathological conditions, the concurrence of which has some intermediate relation to the production of the choleraic phenomena; that, in fact, during the prevalence of the epidemic constitution of cholera, many present this affection of the intestinal glands, each individual case being then in the predicament, that, if the other necessary concurrent causes are brought into operation, the disease shall be developed in the system; but that failing the active operation of these other causes, be they what they may, the cholera state is not produced. How far considerations arising out of this view of the subject may be capable of explaining many anomalous conditions, and, as they are termed, abortive cases of the disease, often found to prevail during cholera epidemics, we shall not discuss at present.

Aggregate glands. — The condition of the aggregate glands observable in cholera is very similar to that of the solitary; the same filling and general intumescence of them exist in many instances. Most least in one very essential point of their pathological anatomy.

What may be the usual mode of elimination of the creamy deposit in the follicular apparatus of the intestines in non-fatal cases, we are not in a position to determine. The cases are usually fatal when the state of intumescence is at its height. When, however, the patients have survived until the third or fourth day of the typhoid state, both the follicles and patches of Peyer have been still found tumid with the exudation, and they have always presented well-marked vascular rings round their margins. In the earlier stage, that is, in the proper choleraic period, the "sago-grain" appearance exists without any special vascularity round the tumid follicles. But the presence of the vascular turgescence in the secondary or typhoid stages undoubtedly indicates the approach of an ulcerative and eliminative process in the glands, which at a still further stage will be found actually established. I have seen ulcerations as early as the fourth day. In some instances, pretty extensive ulcerations of the lowermost patches of Peyer have been found, with vascular ramifications passing into the ulcerating gland tissue: this has been at a somewhat later period. It is by no means improbable that the irritation, and the general intense vascularity, with occasionally actual ulceration of the intestinal glands, has some connection with the development of the typhoid characters.

This remarkable secondary condition is not always presented in cholera epidemics; but when well developed, it exhibits a most close resemblance in its general symptoms to the true typhoid state. The system generally is low; the pulse is weak, though sometimes full and rapid; a general dusky hue of the surface is to be observed; but no eruption of any kind, so far as I am aware, has been noticed. The eyes are suffused, heavy, and dull; the tongue is often thickly coated, sometimes creamy, at other times covered with sordes, which are also formed on the lips and teeth. In fact, after two or three days, the typhoid state becomes as fully pronounced in these cases, as it often is, after a much longer period, in the true fevers of this type. The cyanosed condition in some instances does not disappear altogether for a considerable time, — we have seen it well exhibited even after the tenth day; and perhaps it is this alone that gives, even to an experienced eye, any ready indication of the true nature of the disease under which the patient is labouring. Otherwise, without attention to the history of the case, it would be difficult, if not impossible, to distinguish it by the consideration of symptoms alone, when it is once well established, from genuine typhoid. In one remarkable circumstance, however, the two states differ essentially. In the " cholera typhoid " the characteristic symptoms, though we have known them to be well marked to a later period, usually begin to disappear at about from the seventh to the tenth day; and the re-establishment of the patient, in appearance at least, takes place with what seems an extraordinary rapidity, considering the apparently profound nature of the malady which had oppressed his whole powers but a few days previously. It is not to be supposed, however, that for a very large number of cases of the "cholera typhoid" there is any such favourable issue, for death very commonly takes place within the first ten days. Such cases generally show no symptoms of amelioration, but steadily progress with a decided determination to a fatal issue from the outset.

The development of this secondary typhoid fever in cholera cases deserves special attention in a clinical point of view, as there is certainly some reason to believe that, if not dependent on, it is unquestionably often connected with, a secondary enteric lesion.

Treatment of Typhoid Fever.

In considering the treatment of typhoid, we must ever bear in mind, what pathology shows us to be the preponderating tendency of the disease, namely, to develope formidable lesions of the intestinal glanlar apparatus.

In no class of cases do we find that attention to diagnosis at the very outset of the disease is of such vital moment. Much unquestionably may be done or omitted in the very earliest periods of a typhoid fever, which will influence its subsequent course for good or ill.

With the general development of the typhous aspect, or *facies typhosa*, which takes place in the first few days after the patient is prostrated by a severe fever of this kind, the physician can hardly fail, with common attention to the rules we have laid down, to infer that the case he has to deal with must turn out one either of maculated typhus fever or of the enteric variety, now immediately under consideration.

If the maculæ of typhus and the more profound prostration of that form of fever are exhibited between the fifth and seventh days, as usually is the case, all difficulty of diagnosis is at an end, the case is assigned to its proper place, and proper therapeutic means are put in requisition accordingly.

If a case with the *facies typhosa*, or typhus aspect, passes the sixth or seventh day without the development of maculæ, and without that amount of prostration we should expect in true typhus at this period, we must be on our guard, and give the benefit of the doubt to the side of enteric or typhoid rather than to typhus or maculated fever.

As it happens not infrequently that the development of the rose-coloured lenticular spots of typhoid is delayed to some day between the eighth and twelfth, it is obvious that a period must often intervene in which diagnosis of a perfectly absolute kind is unattainable. Under such circumstances our steps must be of the most cautious kind, and beyond general measures to support the patient's system we are not warranted in using active medicines of any kind. When the rose-coloured spots make their appearance, however sparse they be, if at all characteristically present, our doubts are at an end. But it is not to be forgotten that, under certain circumstances, the eruption of rose-coloured spots seems either to be wholly absent in typhoid, or so very indistinctly developed that it is impossible to rely on them as diagnostic marks. It was a characteristic of the typhoid cases which occurred in such numbers in the army of the East, during the late Crimean war, that the eruption was but very rarely developed, and in many instances was not well recognisable at any stage of the fever.

We are now in a position to consider the clinical relations of the various pathological states which we have just described somewhat in detail, but yet in an incomplete manner, due regard being had to their practical importance.

We already, at the outset of our inquiries into the pathology and clinical history of typhoid fever, made a practical division of the cases of this disease, which we ordinarily meet with in practice, into two principal forms, viz.:—

A. Cases of typhoid fever, with cotemporaneous deposits in the minute glandular apparatus of the intestines.

B. Cases of typhoid fever, in which the deposit into the minute glandular apparatus of the intestines takes place at the close of the primary pyrexial period, and after a variable interval of convalescence more or less complete, undergoes a process of maturation, and then gives rise to a secondary fever.

In the first form of typhoid fever, or that with cotemporaneous deposit in the minute glands of the intestine, we may expect, as already explained, a fatal issue from the violence of the febrile impression, from sphacelus of the intestinal walls embracing the patches of Peyer, or from penetrating ulcers perforating the serous coat, and producing extensive peritonitis. Lastly, death may ensue from hæmorrhage, or exhaustive diarrhœa, with general abdominal irritation.

In the second group of cases, results similar to those just detailed may occur; but they present themselves at later intervals.

Amongst the practical dangers from the ulcerative action set up in the intestines, peritonitis is, without doubt, the most formidable. It may occur without actual perforation of the intestinal wall. Thus a typhoid ulcer, eating deeply through the mucous and submucous tissues, may not infrequently be noticed, which exposes, and ultimately destroys, the muscular textures. When the inflammatory process has effected the erosion of all the mucous tissues, we sometimes find, that from the contiguity of parts the inflammatory lesion is propagated to the serous membrane, which, in its turn, becomes the seat of violent inflammation. We have here an instance of peritonitis developed to a formidable, and, it might be, to a fatal extent, without actual penetration of the serous membrane itself. When the case dies at this period, general agglutination of the abdominal viscera by recently exuded lymph will be noticed. When ulceration of the solitary or aggregate glands exists, the case is liable at any moment to the occurrence of perforation.

The symptoms which attend perforation are usually of a well-marked kind. There is often sudden accession of pain, which is very severe, and attended with a peculiar depressing effect. In not a few instances the patient is himself made aware of the moment at which the perforation of the intestine takes place by a sensation "of something having given way" within the cavity of the abdomen. There is soon induced a state of more or less complete collapse, with an expression of the features, and a peculiarity in the general attitude and decubitus of the patient which, to an experienced eye, at once disclose the nature of the case. No morbid condition, in fact, is attended with a more thoroughly characteristic and almost stereotyped physiognomy than that which we observe in peritonitis from perforation. The features of the face assume a peculiar pinched expression, with vertical rugæ over the root of the nose, dilatation of the alæ nasi, and depression of the corners of the mouth. The breathing is quick, and the respirations are short and incomplete; the respiratory movements, if closely studied, will be seen to be almost exclusively confined to the anterior and lateral parts of the chest; the motions of the diaphragm are reduced to a minimum; and the alternate heavings of the abdominal walls, so regularly noticed in the state of health, are all but suspended. The patient usually lies on his back in a constrained attitude, the lower limbs being flexed, with the knees drawn up; while on the anterior wall of the abdomen the recti and oblique muscles are in a state of medium but persistent contraction, with the object of bearing off pressure from the parts within. The abdomen is hot and painful, and even moderate pressure with the hand produces intolerable suffering and distress, often with a sense of sinking. When the collapse is extreme, the patient lies supine, much sunk down in the bed, and the legs are extended at full length.

The pulse is easily affected in these cases, and becomes small, weak, thready; or if it retain any considerable expansion, it is of the character known as an oppressed pulse. *But the characters of the pulse are certainly not constant in peritonitis from perforation.* At the outset the pulse is occasionally all but extinguished; as reaction takes place it rises in frequency and begins to expand, but hardly ever recovers the volume it had previously to the occurrence of perforation. The rate is variable; it may reach in extreme cases 130, 140, or 150 per minute, and again it may not pass 100 when the lesions are both profound and long-continued. Increased action of the abdominal aorta has been occasionally noticed after, and in some few instances prior to, the occurrence of perforation. The action of this vessel is in these cases in marked contrast as to force and volume of beat to those of the radial artery. The mesenteric, the iliac, and even the femoral arteries have been known to participate in this irritative action.

In making post-mortem examinations in cases fatal after perforation, evidences of more or less extensive peritonitis are met with. The peritoneum is everywhere in a state of intense vascular injection, and here and there in its parietal as well as visceral layers coated with lymphy exudation. Straw-coloured serum is found in abundance in the peritoneal cavity, with yellowish threads of lymph floating through it. The intestines are in many places firmly agglutinated together, and at the part corresponding to the perforation, a nodule of intestine will usually be found glued more firmly than other parts to a contiguous portion of some of the hollow or solid viscera, or to the parietes. It is often exceedingly difficult to detect the point at which the intestine has been perforated, so minute is the orifice. If the intestine be kept under the surface of the fluid invariably effused into the cavity of the peritoneum, in these cases the escape of a bubble of gas will often be the readiest guide to the site of perforation. On the internal aspect the ulcerated patches must be examined in succession and with minute care. The close adhesion which takes place between the part of the intestine which is the site of the perforation, and the nearest solid or hollow viscus, or the adjacent wall of the abdomen, is the means employed by nature to remedy this otherwise necessarily fatal accident. If apposition is maintained for a sufficient length of time, the orifice in the intestine becomes completely closed, and a perfect restoration to the healthy state may ensue, by the gradual healing of the ulcerated surfaces. The irritated state of the intestine, the constant diarrhœal discharges, and the unceasing peristaltic action thus induced, too often unfortunately interfere with the healing process, and disturb the partially formed and still soft adhesions which are commencing to establish themselves between the perforated gut and the adjacent structures. Fresh perforation often ensues from this cause, with renewal of the peritoneal inflammation, under the influence of which the patient usually succumbs. The incautious use of purgatives has been known to produce a similar effect, promoting peristaltic action prematurely, detaching the perforated intestine from its conservative adhesions, and, with the effect of a second perforation, giving rise to a second and now fatal peritonitis.

The therapeutic aim which we should hold in view under these circumstances, is to control the peristaltic action as much as possible: this can be best effected by the free use of opium, and withholding all stimulant food or irritating drink. In the general management of a case of typhoid, we must hold prominently in view from the outset the necessity of sparing the intestinal mucous membrane as far as possible, and this as well by the scrupulous avoidance of all medicaments calculated to irritate the alimentary canal, as by the judicious selection of such articles of food as contain most nutriment and least of excrementitious matter. If it were possible to find an aliment the whole of which would be absorbed in the upper tracts of the stomach, duodenum, and jejunum, without leaving any excrementitial residuum to pass through the ileum and colon, I believe we should be able to deprive typhoid fever of half its dangers.

It must therefore be a course from which there shall be no departure, that when we find a case of fever of doubtful character and presenting any of the typhus phenomena, we must abstain from the use of purgative medicines, and from all aliments of a stimulating or irritating quality. The whole class of emetics and purgatives is thus at once proscribed.

Cases of the *typhoid* type rarely, if ever, present the same tendency to sink at an early period as those of the *typhus* proper, or maculated fever. Failure of the circulation is not one of the dangers we have to anticipate and guard against in typhoid at an early stage. Consequently, stimulants, such as wine, brandy, spirits, ether, ammonia, and the like, are not called for in the first and second week as in typhus, in which it is of such vital moment to anticipate the general prostrating effects of the disease, and especially the weakness of the heart's action.

At the same time, we must not forget that the patient has before him a long process of disease, which may extend over a period of two months, or even more, and which is rarely, if ever, brought to a final favourable issue in less than four or five weeks. To support the system adequately is therefore equally a part of the physician's duty as to avoid unnecessary stimulation. In the first week or ten days of a typhoid case, the physician may have some reason to believe that the alimentary canal is loaded with the remains of undigested food, or fermenting excrementitious matters. Under these circumstances, notwithstanding the articles above mentioned as to the tendency of purgatives, it will be well to commence by washing out the bowels with a mild enema, as the enema emolliens of the Pharmacopoeia, the ordinary soap and water injection, or, better still, some mucilaginous decoction, as that of barley, with or without a tablespoonful or two of salad oil. The enema may be repeated if necessary; but we must be guided a good deal by the nature of the matters evacuated and the state of the abdomen as to fulness, &c., and especially by the sensations of the patient.

From our knowledge of the pathological characters of this form of fever, attention must be given from the earliest period to the state of the abdomen. While it remains unaltered in volume, of natural temperature, and unattended by pain or uneasiness to the patient on moderate palpation, we may be free from apprehension of immediate danger. The slightest appearance of heat, tumidity, or abdominal distress, must, however, be sufficient to make us take the alarm, and suggest measures for counteracting the known tendency to engorgement of the abdominal organs, which is so singular a characteristic of this affection. We must not wait in these cases for pain on pressure, greatly increased heat, ileo-caecal gurgling, and such signs as tympanitic distension of the abdomen, with diarrhoeal discharges, and perhaps bloody or tarry evacuations. *When such symptoms are present, it is all but certain that lesions of an advanced kind, and of most formidable, and we may even say fatal, significance, are already established, and in the majority of such cases it is now too late to apply remedial measures with effect.* In no class of cases does the common-sense rule, "prevention is better than cure," hold with more forcible effect than in these now under consideration. The symptoms we have just enumerated constitute the usual stereotyped rules of diagnosis in relation to typhoid; but unfortunately the nature of the case is only too obvious (except to utterly and culpably ignorant men) by the time that these phenomena attract attention.

From first to last our closest attention must be given to the state of the abdomen in suspected cases of typhoid, and we must be prepared to act with promptitude and decision. Fortunately no very heroic measures are demanded at our hands, and we have not to decide on the use of medicinal agents which constitute an *anceps remedium*, and which, if they do not cure, may possibly kill.

The means we have to adopt in typhoid, under the circumstances in which we suspect actual determination to the intestinal surfaces, consist in the use of leeches, fomentations, poultices, and occasionally it may be stimulant embrocations, to the surface of the abdomen. Pediluvia, sinapisms to the calves of the legs, and other derivative agents may be employed; while leeches to the anus constitute, in my mind, a remedy well worth trying in these cases.

If the amount and kind of the ingesta be properly regulated from the outset, we shall not so often have to contend with the profuse, repeated, and uncontrollable diarrhœa so constantly complained of in typhoid cases. The amount of the evacuations is often very great, while their odour is insupportable: they are fluid, and often of the character known as pea-soup-like, which term well conveys an idea of the consistence, colour, and general character of the dejecta in many cases of typhoid.

In anticipation of the abdominal lesions of typhoid, it would, I am persuaded, be a good and safe practice to commence the use of derivative measures to the abdomen in the early stage, by the use of hot fomentations to the abdomen, and the application of leeches whenever there is the slightest symptom of abdominal tenderness. We have already dwelt on the singular phenomenon of localised irritable action of the abdominal aorta. This may be almost invariably taken as a sign of threatened mischief in the abdominal cavity, if even it so be that intestinal lesion has not been set on foot concurrently with the irritative action in the aorta, femorals, iliacs, or the mesenteric vessels.

Pathological anatomy shows us what a remarkable tendency there is in this disease to the disturbance of the equilibrium of the circulation, and the determination of an inordinate quantity of blood to the serous and mucous surfaces of the abdomen. Derivative measures, therefore, actively and early used to the abdominal parietes seem naturally indicated; and indeed nothing is more grateful to the patient's own feelings, in a good many cases, than the application of warmth and moisture to the abdomen.

On such measures as poultices, fomentations, leeches, or stimulant embrocations to the abdomen, we must mainly depend for the relief of the principal symptoms referrible to the abdomen in typhoid.

When diarrhœa is a prominent feature, and the dejecta copious and offensive, our first enquiry must be as to the kind and quantity of the ingesta, past and present, and these we must control within the limits already defined. If it seems that an amount of aliment has been taken in by the patient greater than his system can dispose of, we may allow the eliminative action to proceed for a short time, with a view to clearing out of the bowels all their effete, ascescent, and irritating contents. It must not be forgotten, however, that in many instances the amount of fluid passed per anum is out of all proportion to that taken in by the mouth. Attempts must be made, under these circumstances, to control the irritable action of the intestines, and opium in its various forms may be used for this purpose. Acetate of lead in doses of from two to three grains in pill, combined with one quarter of a grain or half a grain of opium, may be administered every third or fourth hour. Chalk mixture and other astringents, as Dover's powder, pulvis kino, &c., may likewise be employed.

Cleanliness, *ventilation*, and *separation* of patients in typhoid fever are important rules in the treatment of these cases. The immediate removal from the wards of the dejecta of the patient is a most necessary step; and far less danger is to be apprehended from the free access of air through open windows and doors, than from the miasmata which soon accumulate to a fatal degree of intensity in close wards and ill-ventilated private bed-chambers.

When gastric symptoms prevail, leeches over the epigastrium, occasionally blisters to the same part, and the internal use of hydrocyanic acid in one or two drop doses, with or without the combination of morphia, will be found beneficial; cold drinks in very moderate quantities, and fragments of ice slowly dissolved in the mouth, will also be useful.

When symptoms of perforation occur, our main reliance must be on opium. This drug may be exhibited in any of the usual forms; but the pulvis opii, in one or two grain doses every two hours, oftener or less frequently, according to circumstances, is, perhaps, the best guise in which to administer this remedy. What quantity of opium will be required in individual cases, it is quite impossible to say. Our ordinary experience of opium would not justify us in carrying its use to the length which we find necessary in typhoid fever with intestinal perforation and consequent peritonitis. The powers of the medicine seem, in these cases, expended in maintaining the patient's system at par, and its soporific qualities are, as it were, suspended for the time.

When we have evidence of actual peritoneal inflammation as the result of perforation, leeches must be extensively applied to the abdomen, in relays of twenty at a time, till the abdominal pain and distress are alleviated. In these cases calomel and opium seem suggested by the ordinary rules of our art, but their exhibition in combination is of more than doubtful propriety. Mercury exerts its specific influence as a mineral poison in many cases, no matter how carefully we endeavour to guard its effects by opium. The slightest peristaltic movements will serve to displace the adhesions which nature with a conservative effort is establishing. Our main reliance, then, must be placed on opium boldly, but at the same time judiciously, employed. As much as 105 grains of opium have been administered in a single case; but this must be looked on as a very extreme instance. Under circumstances of not very unusual violence, two-grain doses of opium, continued at two or three-hour intervals for thirty-six or forty-eight hours, must be looked on as a very full and even liberal use of this drug. It may be that we shall find that, within the first twenty-four hours, what with leeches, fomentations, and the application of very light and exceedingly thin poultices spread on, (or better) between, folds of fine gauze, the symptoms of peritoneal inflammation have substantially diminished; we may now reduce the doses of opium in quantity and frequency, the principal aim being to retain the intestines in such a paralytic state as will prevent the possibility of any but the most insensible peristaltic action. Constipation ensues as a natural and highly favourable result, and with this state we must not attempt to interfere. If it be asked at what interval after perforation of the intestines we may safely administer a purgative by the mouth or anus, I should say, at no interval, however long, till nature spontaneously brings about the action of the alimentary canal. The junior practitioner will do well never to lose sight of the case we have already detailed, which furnishes such a salutary warning, and in which the exhibition of a mild saline aperient was followed by the detachment of the intestine from its adhesions, fresh perforation of the peritoneal cavity, and death from the renewal of the peritoneal inflammation.

Hæmorrhage from the Intestines.—Hæmorrhage from the intestines may occasionally occur as the result of the intense congestion of the mucous surface which we have seen to be so constantly developed in typhoid. More usually, however, it would appear to be the consequence of ulcerative erosion of the minute vessels in the neighbourhood of the affected glands. The black or tarry evacuations in the fourth or fifth week are, in all probability, caused in a similar way, only that the escape of blood takes place more slowly, this fluid accumulates in the intestine, and, under the action of the intestinal gases, and usually alkaline contents of the intestine, becomes of a dark hue and tarry consistence. Acetate of lead and opium, tannin or gallic acid, and occasionally the perchloride of iron, seem the appropriate remedies, and are sometimes successful, while the mineral acids are decidedly contra-indicated in my opinion. Too often, however, hæmorrhage or tarry evacuations, if in any considerable quantity, only too plainly indicate the existence of extensive ulcerative lesions, over which we can exercise but temporary control; fresh hæmorrhage ensues from extension of the erosive action on the intestinal walls, and death takes place often after the dejection of little altered blood in considerable quantity. With respect to the secondary lesions which occur in the course of typhoid fever, our attention must be carefully given to the several great organs, with a view of anticipating typhoid invasion of their textures. The lungs must be carefully explored by percussion and the stethoscope, and appropriate remedies must be early exhibited when signs of congestion or consolidation are detected. Under this head we may refer the reader to what has been already so fully dwelt on in reference to the secondary lesions of typhus fever.

Renal congestion, with partial suppression of urine, excretion of albumen, bloody discoloration and diminution of the urea and salts, are sufficiently often met with in bad cases of typhoid. Our therapeutical efforts must be early directed to relieve the congestion of the organ, by wet or dry-cupping over the loins, mustard poultices and such means. Diuretics must be used with caution, though it is certainly a clear indication in this class of fevers to promote and maintain the action of all the eliminative organs.

Wine and other spirituous stimulants are of but doubtful use in typhoid fevers. When, however, it seems that, under the combined influence of the typhoid poison, and the depressing effects of any of the great secondary lesions we have been considering, the case appears likely to sink by failure of the vital powers, wine may be administered with a liberal but cautious hand. The stronger and drier wines, as port, sherry, and Madeira, are preferable in these cases to Clarets, which are cold and subascescent, and may promote irritation of the bowels; brandy may likewise be used. We must be guided by the symptoms of each individual case as to the quantity and kind of stimulants which will be required, and no general rules seem possible on this head.

As a general medicament, applicable in all stages of typhoid fever, no drug seems safer or more appropriate than quinine. Its employment is not indispensable, but for the reasons urged on a former occasion, a safe medicine, given at regular intervals during the course of a disease like fever, promotes confidence, and gives the physician an opportunity of enforcing order and punctual attention to his directions on other matters.

In those cases in which there is a partial and deceptive lull in the fatal symptoms, the administration of quinine may be continued with good purpose by the experienced physician, whose knowledge of the pathology of typhoid tells him there is possibly yet much mischief in store for his patient.

Typhoid fever, with an interval of partial convalescence.—Nothing but the most thorough knowledge of the pathology and pathological anatomy of typhoid fever, as we have endeavoured to develope it in the foregoing pages, will prepare the practitioner for that class of most deceptive cases in which partial convalescence is established after the third or fourth week of the fever, but in which intestinal lesions silently progress.

In very many instances, doubtless, typhoid fever will be found to progress for six, eight, or ten weeks, with only very indistinct remission of the pyrexial state, the patient perhaps dying out quite exhausted and emaciated at the end of this period; or, on the other hand, he may slowly progress to final convalescence, through insensible stages, towards the end of the second month.

In the class of cases now to be considered, a primary pyrexial period is observable, which is sometimes brought to an apparent termination by an attempt at crisis, more or less well marked. The duration of this first febrile period is very variable; it may be extended over three or four weeks, and we have known it to be of not more than eight, ten, or twelve days' duration. This was the case in numerous instances during the late Russian war. The delusive convalescence is sometimes as rapid under these circumstances as it is really incomplete, the patient returning to his ordinary avocations, and perhaps excesses and indulgences, in all the full confidence of completely restored health. The medical attendant is often as much deceived as the patient, who is officially returned as fit for duty, or if in private life, gets prematurely a *carte blanche* to return to his usual employments and pleasures.

We have seen, from pathological anatomy, how deposit in the solitary and aggregate glands, to a very large extent, may remain quiescent for a long period. It is presumable, that in many such cases, with judicious management, the gradual elimination of the deposit might have been brought about without the induction of ulcerative action in the intestines. Incautious exposure, premature exertion, and the use of food and drink of irritative quality, insidiously light up inflammation around the follicles and patches of Peyer. This process localised for a time sooner or later reacts on the system, and secondary fever of a slow and obscure kind is developed, with subsequently pain and distentions in the abdomen, diarrhœa, bloody stools, tympanitis, and it may be perforation of the intestines, and fatal peritonitis.

The practical inferences under these circumstances are, to keep the patient under watchful care, to restrict his physical exertions, and above all things to regulate his dietetics in such a manner as to expose him to the least possible risk of irritative action being induced in the still delicate mucous surfaces.

With cases in private life our task is a comparatively easy one. Few patients will be so blind to the interests of their own physical health, as not to follow with implicit obedience the medical and dietetic rules prescribed by an intelligent physician, more especially if a wholesome lesson in the pathology of their case is communicated to them, just sufficient, without unnecessarily alarming them, to give them some insight into the practical bearings of the regimen laid down for their guidance.

Amongst the poorer classes, pressed on all sides and at every moment by the urgent necessities of their condition of life, and the temptations to which they are exposed, precautions of this kind are of little avail, unless we can keep them under our own eye in hospital.

Very much the same observations apply to the case of men employed in the public service, whether as soldiers or sailors. The pathology of typhoid fever furnishes another and most conclusive argument for the necessity of convalescent hospitals on a large scale in civil as well as in military life.

CHAP. VIII.

(SUPPLEMENTARY.)

FULL and complete records of the pathological anatomy of typhoid fever are not readily accessible, and I have therefore thought that it may not be without interest and advantage to the student and junior practitioner to append to the foregoing chapter on typhoid fever an abstract of my Report on the Pathology of the Diseases of the Army of the East during the last Russian campaigns. During the investigations then prosecuted on a very extensive scale in the hospitals of the camp before Sebastopol and in the large hospitals at Scutari, I had the good fortune to be assisted by Professor William Aitken, now of the Army Medical School, a gentleman of the most eminent attainments and skill in pathology and pathological anatomy:—

TYPHOID FEVER,

AS OBSERVED IN THE ARMY OF THE EAST.

Of the fevers prevalent in the Army of the East during the period of our investigations, the typhoid was undoubtedly the most important, and the most fatal.

Not only was this form of fever found to be immediately and directly fatal in several cases, but even after an apparent convalescence, formidable secondary lesions were very frequently developed as a consequence of it. After a more or less protracted course, and often with great suffering to the patient, these lesions not infrequently brought about a fatal issue.

It was from this tendency to the development of secondary lesions, and also from their very frequently latent character, that this variety of fever derived its chief importance. It was not uncommon for the febrile symptoms entirely to disappear, a certain amount of convalescence to take place, and the patient in many instances to return to duty, while, as the issue showed, a diseased action was slowly but steadily progressing in his system; the course of such secondary disease being, perhaps, not uninfluenced by the exposures and irregularities of the soldier's life. At a period more or less remote from the primary attack, a fresh invasion of symptoms took place, liable to be mistaken for a new attack of disease, when due attention was not paid to the previous history of the case. In many instances, however, no such period of intermission was observable, and the patient, with imperfect attempts at convalescence, followed by almost immediate relapse, passed from the primary to the secondary or tertiary stages of the disease. Such attacks we have known to be extended in some instances even over a period of some three or four months, before a fatal issue took place.

It is obvious that when such a form of disease is ascertained to prevail, the utmost precautions are necessary, not only during the primary attacks, but also during periods of apparent convalescence. Whether or not medical or other means are capable of much influencing the course and issue of these cases, we are not quite prepared to say, but there can be little doubt that exposure, irregularities of diet, and excess in the use of intoxicating drink, during such fallacious periods of convalescence, when they occurred, largely deprived the patient of his best chances of a permanent restoration to health.

It cannot be said that the typhoid fever was at any time absent from the camp. The general tendency of all serious febrile states was decidedly more to the assumption of the typhoid type than to that of the typhus proper. Thus we have known very fatal forms of the typhoid disease with profound intestinal lesion to occur as the second attack in the group of so-called Relapsing fevers, already noticed. In other instances, the typhoid has been the third, and even the fourth in the group of febrile attacks. On no occasion, however, within our experience, has there been any extensive or epidemic invasion of the disease. At one or two periods (end of October and commencement of November), we have known it to present itself in a very severe and rapidly fatal form, but happily it ceased to spread before it had engaged any large numbers of men.

Cases of this disease, such as we have seen them, admit of division into two broad and practically useful classes: namely, *first*, those which were immediately fatal; and *second*, those in which longer or shorter periods elapsed between the first attack and the final issue.

Of the first class of cases, we have met some well-marked examples, presenting the most full development of the characteristic abdominal lesion. These cases on admission presented the usual character of the pyrexial state. The face was flushed, the skin hot, and the pulse frequent. The complete " typhous " aspect was soon assumed; sordes formed on the lips and teeth; the skin presented a general dusky aspect, with indistinct mottling of the surface. It was also, as in other cases, often closely covered with minute hæmorrhagic and often scorbutic spots, which appearances doubtless served much to mask any characteristic eruption. Be it from this, or whatever other cause, we have but very rarely been able to determine the presence of a well-marked or characteristic eruption in cases subsequently fatal by the abdominal lesion. We cannot state that any such eruption was positively absent; but, when present, it was obscure, very difficult of recognition, and frequently, in consequence, overlooked. On the whole, we think we are warranted in saying that the typhoid eruption was much less marked and much less characteristic in the disease as presented in the Crimea, than we have been accustomed to find it under other circumstances: and we think it is not impossible that this may have been to some extent a differential character of the form of the disease which prevailed in the Army of the East.

Much variety was observable in the other clinical characters of the disease. With regard to those referrible to the abdominal organs, very opposite conditions seem to have been presented. Thus, in a case fatal within from ten to twelve days, with a most profound lesion in the small intestine, proceeding in some points to actual perforation, complete sphacelus of several of the patches of Peyer, and extensive general peritonitis, it is stated in the clinical history furnished to us that during the greater part of the patient's illness the bowels were regular, and he complained of no pain in the abdomen till a short time before death. Such a case, however, is decidedly to be regarded as exceptional; but it well exemplifies the necessity for the utmost care in diagnosis, and the most scrupulous precautions in treatment; where such a type of disease is suspected to prevail, it is needless to observe that drastic purgatives are wholly inadmissible. Gastric symptoms were not uncommon in this fever. In some cases irritability of the stomach, with frequent vomiting, was an obstinate and troublesome symptom. Diarrhœa, with more or less abdominal tension and pain, have been very commonly present. Evacuations of blood per anum have also occurred in the early stage in some cases; in the later stages of the chronic forms of the disease, tarry evacuations have occasionally been present, but these have been by no means constant or even general characters. When perforation occurred, a new set of symptoms was of course developed, of a character which could seldom be mistaken; and they usually preceded the fatal issue by only a short period.

Thoracic complications occurred pretty often, more especially in the chronic forms of this fever, but during the primary fever we have not observed pulmonic lesion so commonly or to so important an extent, as when it occurred in connexion with the typhus proper; in the typhoid, in its early stage, we have not known more than two or three cases which proved fatal directly by the thoracic complications.

Symptoms referable to the nervous system have presented themselves in the typhoid to a less extent than in cases of typhus proper. In very low forms of the disease, while in its acute stage, we have known bed sores to be formed; these affections were more common, however, during the secondary periods; considerable, and even sometimes excessive, emaciation was likewise often presented in these latter cases.

The general character of this disease, with the early prostration of the patient's strength and his long continuance in a low state, bring it clearly under the great typhous type, the chief features of which we have already delineated; and the general observations we before made, as to the therapeutic indications furnished by a consideration of its pathology, apply here again.

The following Table exhibits the chief pathological characters of some of the most marked forms of typhoid fever which came under observation in the late Crimean War. The cases are selected from a much larger body of examples, with a view to illustrate the several conditions of the enteric lesions, and also the various morbid processes associated with this fever in its advanced stages.

TYPHOID FEVER,

WITH FOLLICULAR INTUMESCENCE AND ENTERIC ULCERS.

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases and of their chief Post-mortem Appearances.
Private John Stockton	20th	. .	This patient presented diarrhœa at the commencement and throughout the course of his illness. There was also some gastric irritation, and vomiting occurred from time to time. Pain on pressure and gurgling were observable in the ileo-cæcal region. There was much nervous irritability, attended, towards the close of the case, with violent and almost constant subsultus tendinum. Bed sores became established, and death took place on the fourteenth day after admission. This case was reported as "Crimean" fever. The chief morbid appearances were confined to the small intestine. *Ileum.*—Enlargement and prominence of the solitary follicles existed at the upper part: in the lower, the glands were ulcerated. Very extensive ulceration of Peyer's patches existed throughout. *Mesenteric glands.*—These glands were much enlarged and greatly congested. *Kidneys.*—The glands were enlarged by about one volume. No other morbid appearances were found.
Private James Jones, aged 20	28th	4,258	This patient, aged twenty, was an English labourer of unhealthy aspect. On admission the symptoms were pains in the limbs, flushed face, and hot skin. The tongue is, however, stated to have been clean, and the bowels regular. Much thirst was complained of. The pulse gradually became more rapid and feeble; there was great restlessness and delirium, especially at night. The bowels continued regular, and it is said that no pain in the abdomen was complained of. Three days before his death slight mucous diarrhœa supervened. The weakness increased till the tenth day after admission, when vomiting set in, and death supervened. The disease was returned as common continued fever. The morbid appearances were chiefly confined to the abdominal cavity. *Abdomen.*—Extensive peritonitis, with effusion of recent lymph and serum, and a general agglutination of all the viscera was found on opening the cavity. *Ileum.*—The whole of this intestine was most intensely congested, and of a deep bluish

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private James Jones—*continued*	28th	4,258	black colour. On opening it, similar appearances presented themselves. The whole of the minute glandular apparatus was in a state of extreme and extensive ulceration. Several of the patches of Peyer were in the last stage of sphacelus, destruction of the intestinal tissues down to and inclusive of the peritoneum having taken place; in some parts the sloughs dropped out, leaving large oval holes, on an attempt being made to hold up the intestine. Perforation had occurred at several points.
" "	14th	. .	This patient had had short fever, from which he convalesced imperfectly. A second attack supervened within a short period, and was attended by a fatal issue on the eighth or ninth day. The chief morbid appearances were confined to the small intestines, which were deeply congested, and together with the mesentery presented a bluish red tint. *Ileum.*—This portion of the intestine was most engaged, and chiefly in its lower half. Some of the upper patches of Peyer were a little prominent, red, and swollen; these characters became gradually developed towards the termination of the ileum. In the lower third the solitary follicles were immensely enlarged; they were conical, greatly elevated above the surface, and some of them as large as the biggest peas. They were of a mixed reddish and yellowish colour, and presented the same appearance on section. They were of considerable consistence, and presented no evidence of any tendency to softening. The lower sets of Peyer's patches were from one-eighth to one-quarter inch prominent, of a deep brownish red colour, and their individual glandulæ were much swollen. *Colon.*—Some of the follicles of the large intestine were similarly filled with deposit, but in no instance were they ulcerated. *The Mesenteric glands* were universally enlarged, some to the size of large kidney beans, and deeply congested within.
Private Cusack, aged 19	49th	. .	This patient, aged about nineteen, arrived in the Crimea only a couple of months previous to the illness which proved fatal to him. He was of a strumous aspect, with sandy hair. He got a short fever, which lasted about seven days, when he convalesced sufficiently

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private Cusack—*continued*	49th	. .	to be able to leave hospital. He was obliged to seek admission again in two or three days, when a continued fever of low adynamic type developed itself. No maculæ were observable. It was stated that he had bloody stools on admission: he had diarrhœa for a couple of days in the mid period of the disease, but this symptom was not constant or troublesome afterwards. On the thirteenth day of his second illness he was very low, with sordes on the teeth; the pulse was 140, large, but very soft and compressible. The face was highly congested, and much bronchitis was found over both lungs posteriorly. Bed sores formed soon after, but death did not take place till the twenty-fourth day of the disease. Sectio Cadaveris was made five hours post mortem. Thermometer about 80°. *Abdomen.*—Considerable congestion of the abdominal viscera was found. The small intestines were contracted, at numerous points, to one-fourth of their normal calibre; in parts they assumed the cubical or quadrilateral form. *Ileum.*—This intestine was deeply congested on its mucous surface, and presented numerous deeply eroded ulcerations, chiefly corresponding to Peyer's patches, which were completely eaten away down to the muscular coat. This state of erosion was most extreme in the last three or four patches near the ileo-colic valve; the muscular coat lay bare, red, and dry at the base of these ulcers. The borders were thick and elevated, but exceedingly irregular and angular. There were several minor erosions, corresponding to the site of the solitary follicles. The intervening mucous membrane was thick, and of a dark bluish red. *Colon.*—More regular oval-shaped ulcers existed in this intestine, the mucous surface running level to the edge of the ulcer. The lower parts of this gut showed some dysenteric change. *Lungs.*—Extensive bronchitic congestion existed; the terminal tubes were filled with a viscid glairy fluid.
Private Josh. Wilton .	82nd	3,438	Arrived at Scutari from Cephalonia with a draft of troops on the 30th of August, in a low, prostrate, and nearly comatose condition. The pulse was rapid and feeble. There was no eruption of any kind visible. He re-

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private Josh. Wilton—*continued*	82nd	3,438	mained in this low typhoid state throughout, and gradually sunk, without any well-marked local complication other than oppression of the thoracic viscera and the vital functions generally. This case was returned as common continued fever. Examination was made on the 7th September. Thermometer 79°. The body was soft and flabby, the flesh dry and of a dark red colour. *Cranium.*— The cortical portion of the brain appeared somewhat softened, and the pia mater was in a highly congested state. *Thorax.*— The lungs were engorged throughout, and more especially in the posterior and lateral parts; their substance generally was soft and friable; there was no definite condensation; the friable condition was more remarkable in some places than in others. *Abdomen.*— The mucous membrane of the small intestines in the upper part generally appeared in a healthy condition, but towards the lower part of the ileum it was remarkably thin and wasted. Throughout the lower portion of this intestine the patches of Peyer were in a state of active turgescence, partly from exudation into the gland follicles, and partly from greatly increased vascularity in and around the individual patches. The exudation, though soft, had not commenced to break up or to ulcerate. *Colon.*— The mucous surface of this intestine was dotted over in a very marked manner, with the dark minute orifices leading to the solitary vesicular glands. For the most part, these glands were in a state of intumescence, and felt hard under the finger. They were filled with an exudation consisting chiefly of very fine minute cells and granular matter. *The Spleen* was much enlarged, softened, and friable, exhibiting on section a pulpy consistence, and a deep mulberry hue. *The Kidneys* were highly congested and swollen; this state was especially remarkable in the comparative increase of the cortical substance and its coarse fibrous appearance. *Mesenteric glands* greatly enlarged throughout.
Colour-Sergt. Joseph McGill, aged 32	33rd	2,263	No history accompanied this case, it was returned as febris C. C. Examination on July 12th. Thermometer 80°. Petechial spots were visible (post mortem) over the iliac regions, the feet, the legs, and the

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Colour-Sergt. Joseph McGill—*continued*	33rd	2,263	arms; no papular eruption existed; the superficial veins appeared to contain decomposing blood. *Thorax.*— The heart was flabby and soft, with fluid blood in its cavities and in the large vessels. In the *Lungs* hypostatic congestion existed in the lower lobes. The pulmonary substance was softened and friable throughout; an exudation of a dirty — half gelatinous, half grumous — material, was confined to lobar masses. *The Bronchial glands* were enlarged, particularly those at the roots of the lungs. *Abdomen.*— The intestines throughout were distended with fœtid gas, developed more especially in the colon. The mucous membrane of the small intestine was livid, intensely congested, and coated with mucus. *Peyer's patches* were extensively infiltrated with a dirty white exudation, and were surrounded with zones of excessively congested blood-vessels. This condition of the glands extended throughout the lower third of the ileum; and in the colon, the solitary glands appeared to be in a similar state of intumescence. *The Mesenteric glands* were enlarged throughout, and some of them were commencing to soften in the centre. On *Microscopic* examination, the deposit presented the usual appearances of the imperfectly developed exudation in the typhoid condition, large clear irregular cells, with a greater preponderance of granular and molecular débris.
Private Jas. Vahez, aged 27	88th Gren. Com.	. .	This case was returned as febris C. C. Inspection was made on July 8th. Thermometer, 78°. *Thorax.*— The lungs on both sides were much enlarged; the amount of blood contained in them was excessive. Posteriorly they were softened, and much engorged with a bloody serum, and their texture throughout was very friable, with entire absence of air in the posterior parts. *The Heart* was flabby, and the blood dark and fluid in its cavities and in the large vessels. *Abdomen ; Intestines.* — Congestion of a dark livid character existed throughout the mucous membrane of the ileum. Peyer's patches and the solitary glands were filled with a whitish tawny exudation, which raised the patches

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private Jas. Vahez—*continued*	88th Gren. Com.	. .	considerably above the mucous surface. Neither softening nor ulceration had commenced, but circles of intense vascularity surrounded both the patches and the solitary glands. *Kidneys.*— Both of these organs had a tumid appearance; their tunics separated with ease, exposing a granular and highly congested surface. On section, the cortical substance was comparatively increased in bulk, its appearance coarse, fibrous, and granular. *Spleen* large, with deposits visible over its surface, of a dark purple colour. On section, its substance appeared granular but firm, and of a dark mulberry hue. *The Mesenteric glands* were enlarged, with surrounding vascularity, and in some places were commencing to soften.
Private Geo. Symes .	19th	3,420	In this case the only account to be obtained showed the chief characteristic features of the typhous state; but the patient had been only four days at Scutari from the Crimea before his death. This case was returned as febris C. C. Post-mortem examination on July 9th. Thermometer 76°. *Thorax.*—The pleural cavity on the left side of the chest was filled with purulent effusion, so as to compress the lung to about two-thirds of its bulk. *Both Lungs* were gorged posteriorly with dark-coloured blood, and the pulmonary texture throughout was in a softened and friable condition. On the anterior aspect of both lungs, on section, there were deposits of exudation marked on the surface of the pleuræ by considerable opacity of that membrane. Small pus-like exudations were here and there diffused throughout its substance. *Abdomen.*—The mucous surface throughout the small intestine was in a highly congested state, and the patches of Peyer were intumescent from exudation, but not ulcerated.
Sergeant-Major Thos. Madden, aged 28	L.T.C.	990	This patient arrived from the Crimea on the 28th October, with fever of two months' date; no farther account being obtainable of his condition. Examined the day after his arrival; his pulse was small, weak, and wavering; well expressed maculæ were observable over the chest, back, and arms. The tongue was dry, leathery, brown, and excessively furred. Three days after admission his

Name of Patient.	Regt.	Regi-mental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Sergeant-Major Thos. Madden, aged 28—*continued*	L.T.C.	990	condition seemed to improve, his tongue and mouth becoming naturally moist, and some sleep was obtained. On the following day, however, sudden and violent purging commenced, with rice-water evacuations, but no cramps, coldness, or sinking, and urine was passed in small quantity. The purging continued more or less during the two following nights and days, and he died on the 4th November, having been seven days in Hospital at Scutari. This case was returned as "Common Continued Fever." The body was much emaciated; the muscles were of a dark red colour. *Thorax.*— The lungs were bloodless generally, although congested behind. Fluid and dark blood was found in the heart and great vessels. *Abdomen: Intestines.*— There was excessive congestion throughout the mucous membrane of the ileum. Peyer's patches were highly congested and turgid with exudation, so also were the solitary glands; but neither ulceration nor softening was yet established. The specific gravity of one of Peyer's patches was ascertained to be 1·035. The contents of this part of the intestine were of a dark tar-like aspect. *The Colon* contained evidence of old ulceration from the dysenteric process, its substance towards the lower part and in the rectum being greatly thickened and condensed. Small punched-out ulcers remained, with sharp edges and pale bases, irregularly disposed on the mucous surface near the sigmoid flexure. Vascular patches existed here and there throughout the rest of the mucous membrane, more especially expressed at the caput cœcum, where numerous solitary glands were found filled with exudation. The specific gravity of the mucous membrane of the rectum was 1·044. *The Spleen* weighed 5¾ ounces; its specific gravity was 1·058; three masses of condensed dark-coloured exudation existed along the anterior border of this viscus, the exudation consisting of granular matter and changed blood. *The Kidneys* were large, tumid, and friable, with comparative increase of the cortical substance. Weight, respectively, right 5¾, and left 5½ oz.

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private Hugh Love, aged 25	L.T.C.	1,301	This patient arrived on the 28th October from the Crimea; it was ascertained that he had been in hospital since the 4th of June. The febrile condition, with considerable thoracic oppression, was well marked on his arrival at Scutari. He died three days subsequently. The case was returned as "Febris C. C." There was considerable emaciation of the body. *Thorax.*—The left lung was condensed throughout, and was of a bright red colour on section, and non-crepitant, except a small portion of the apex. The lower and posterior parts of the inferior lobe were in a similar condition, and the texture of both was friable. The *Bronchial mucous membrane* was highly vascular; its secretion tenacious, and in some parts purulent. The *Pulmonary artery* contained a coagulum ramifying to its third and fourth divisions through both lungs. The bronchial glands were much enlarged. *Abdomen.*—The mucous membrane of the small intestine was of a moist, velvety, not unhealthy appearance, but with considerable congestion here and there round Peyer's patches. These were firm and prominent, but not unnaturally loaded. The *specific gravity* of a full firm patch was ascertained to be 1·040. That of the mucous membrane of the ileum, 1·036. The jejunum was pale and bloodless; its specific gravity was 1·030. The mucous membrane of the colon and rectum was universally red, but there was no ulceration, except in the rectum near the anus, where there were remains of a dysenteric process of old standing. The ulcers appeared to be in a contracting healing state. The mucous membrane of the colon had a specific gravity of 1·037, that of the rectum 1·038. *The Mesenteric glands* were highly vascular. Their specific gravity was 1·037; that of a pale bloodless one, 1·033. The parotid gland was in a state of suppuration, with excessive congestion amongst the interstitial tissue of the lobules; its specific gravity was 1·040. *The Spleen* was of very large dimensions, weighing 20 ounces. On section a softened exudation enclosed in a cavity with condensed walls was shown, extending over about two inches of surface. This exudation was of a yellow colour, and consisted of small cells

Name of Patient.	Regt.	Regi-mental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private Hugh Love—*continued*	L.T.C.	1,301	and granular elements, chiefly of broken down exudative material. The rest of the substance of this viscus was firm in consistence, and of a mulberry aspect, with here and there little deposits of exudation in the crude state, similar to more crude portions of the large yellow softened mass. The capsule was smooth, opaque, and firm. The specific gravity of the organ was 1·046. *The Liver* was of large size; weight, 96 ounces, of flabby œdematous fatty consistence, with congestion of the hepatic veins, which gave it a mottled appearance: its specific gravity was 1·043. *Kidneys.*—The left weighed 9½ ounces, the right 7 ounces; their tunics peeled off readily, leaving a mottled surface beneath from the stellate patches of venous congestion irregularly distributed over it, the intervals being extremely pale. Sections showed white fat-like deposition here and there in the cortical substance, which was greatly tumified. A piece much infiltrated with exudation had a specific gravity of 1·034; a piece less so was 1·036. Microscopically, this exudation was made up of epithelial cells, and of a large quantity of dark granular matter, with crystals of phosphates. The cells appeared to be the proper secreting cells of the gland altered by condensation and granular degeneration.
Private John Gregory, aged 20	6th Drags.	. .	This case was admitted on the 6th, and died on the 28th of December. It was returned as "Febris C. C." Examination on the day of death. Thermometer, 58°. *Cranium.*—The arachnoid was opaque, with effusion underneath; the lateral ventricles were filled with serum, and the choroid plexuses much congested. *Thorax.*—Crude tubercle was deposited in both lungs to a limited extent. There was besides much congestion of the pulmonary tissues. *Abdomen:—Intestines.*—Irregular congestion of the mucous membrane existed. Peyer's glands were congested and intumescent, but there were no ulcerations. The entire mucous surface was speckled over with small spots of a vivid scarlet colour; some of the aggregate patches exhibited similar spots. The sigmoid flexure of the colon was much congested; there were no ulcerations, but in the upper part of the rectum there

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private John Gregory, aged 20—*continued*	6th Drags.	. .	was a large isolated patch of lymphy exudation. This case was one in which, probably, the scorbutic and tubercular dyscrases co-existed, the latter called, probably, into operation by the influence of the fever.
Private George Nicholas, aged 21	7th	3,735	Admitted on the 8th of July from the Crimea, and died on the 12th of August, having been 34 days in hospital. This case was returned under the head of "Diarrhœa." The examination was made on the 12th of August, the thermometer being 70°. *Cranium.*—There was slight congestion of the membranes of the brain. *Thorax.*—The lungs were healthy, but their pleuræ exhibited old adhesions. *Abdomen.*—The intestinal mucous surface generally was congested, and of a dark red colour. Peyer's patches were deeply ulcerated, especially in the lower part of the ileum. These ulcers had greatly thickened edges with sloughy centres. The spleen was greatly enlarged, hard, but easily broken up. *The Mesenteric glands* were enormously enlarged.
Geo. Gray, aged 20	2d Bat. R. B.	4,457	Admitted to hospital on the 23rd of July, and died three days afterwards. This case was reported as one of "Common Continued Fever." Post-mortem examination, July 24th. Thermometer, 83° in dead house. *Cranium.*—Great congestion of the pia mater existed. *Thorax.*—Old adhesions of the pleuræ on the right side were found, with emphysema of the left lung. *Abdomen.*—Peyer's patches throughout jejunum and ileum were in a state of softening and ulceration. In the ileum, the softening and ulcerations were most extensive; in many of the ulcers, a brown slough in the centre, and well-marked raised edges were observed. *The Mesenteric glands* were much enlarged.
Driver James Corry, aged 21	R.H.A. C. Troop.	. .	Admitted to hospital on the 7th, and died on the 11th of December. This case was returned as "Diarrhœa." Examination on day of death. Thermometer, 56°. *Thorax.*—Hypostatic congestion of both lungs. *Abdomen.*—The small intestines were most prominently the seat of disease. At the

Name of Patient.	Regt.	Regi-mental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Driver James Corry, aged 21—*continued*	R.H.A. C. Troop.	. .	lower end of the jejunum Peyer's patches were very prominent, and surrounded with a well-marked ring of congested vessels. Throughout the ileum the patches of Peyer were largely ulcerated; these ulcers, in the majority of cases, being nearly an inch in diameter, with raised edges and brown central sloughs, and close to the cœcum, the ulcerative action had laid bare the peritoneum. *The Solitary glands* were prominent throughout the great intestine, with some circular ulcers near the cœcum. The *Mesenteric glands* were much enlarged.
Farrier John Eaton, aged 32	1st Drags.	1,136	This patient was admitted to hospital on the 1st of December, and died on the 3rd of January, 1856. The case was reported as one of "Common Continued Fever." *Thorax.*—On sectio cadaveris there was found hepatization of the upper and posterior part of the right lung, the texture of which was generally congested and friable. The bronchial tubes were filled with bloody frothy mucus. *Abdomen.*—Prominence and congestion of the aggregate and solitary glands were observable throughout the small intestine, and at lower portions of gut half the glands were ulcerated. *The Colon and Rectum* contained ulcers, and other remains of an old dysenteric process. *The Spleen* was large and soft, and of a dark red colour, and its substance pulpy. Weight, 7½ ounces. *The Kidneys* were of a dark red colour, with great congestion of their substance generally, and of the membranes of the calyces, pelvis and ureter especially. Weight, right, 5½ oz.; left, 6 oz.
Private William Foot, aged 28	13th L. Drags.	133	Death and examination on the 7th of December. Thermometer, 56°. This case was returned as "Dysenteria Chronica." *Cranium.*—Nothing of note. *Thorax.*—Extensive vesicular bronchitis pervaded both lungs, with scattered spots of lobular pneumonia principally situated at the base of the left. *Abdomen.*— The mucous membrane throughout the upper portion of the small intestine was generally pale, with a few isolated patches of bright red congestion. In the lower portion prominent ulcers prevailed in the site of

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private William Foot aged 28—*continued*	13th L. Drags.	133	Peyer's patches, covered with a tawny slough. Towards the cœcum they increased both in number and size, varying from 1 inch to 1½ inches in diameter. No ulceration was found in the large intestine; its mucous surface was pale. *Spleen*, soft and dark-coloured, with friable tissue. *Mesenteric glands* enlarged.
Private David Prior, aged 20.	17th Lancers	1,205	Admitted to hospital on the 21st of July, and died three days subsequently. Reported as a case of "Common Continued Fever." *Cranium.*—Nothing of note; parts comparatively healthy. *Thorax.*—There was considerable lobular pneumonia of the right lung, and also some old pleural adhesions on the left side. *Abdomen.*—Peyer's patches in some parts of the jejunum, and throughout the whole of the ileum, exhibited various stages of softening and ulceration. *The Mesentric glands* were much enlarged.
Private James Lindsay, aged 19.	93rd	3,583	Contracted fever in the Crimea about the latter end of August; he was admitted to hospital at Scutari on the 7th of October, and died five days after; thoracic oppression being the most urgent feature of the case. The disease was returned as "Pneumonia." The body was considerably emaciated. *The Mucous membrane* of the lips presented a livid aspect. Within the mouth it was soft and turgid, the sub-mucous glands being obscure, of soft consistence, and cellular in contents. *Thorax.*—The lungs were adherent at both sides, collapsed unequally and insufficiently, the right remaining about double the volume of the left. Towards the lower part of the left lung the texture was œdematous, with excessive congestion of the bronchial membrane, and frothy mucus filling the tubes. The right lung was consolidated throughout, and friable. The exudation appeared on section to be very uniformly infiltrated throughout its substance, consisting, microscopically, of granular and fibrinous elements, with abundance of exudative corpuscles, breaking up into molecular matter. A thin layer of yellow lymph covered the serous surfaces, and glued the lobes together. The specific gravity of the condensed and friable lung was 1·042.

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private James Lindsay, aged 19—*continued*	93rd	3,583	*The Heart* appeared normal; its specific gravity was 1·042. *Abdomen.*—The mesenteric glands were enlarged, but not softened, except those connected with the rectum. Their specific gravity was 1·040. *Small Intestines.*—In this part of the gut there were several ecchymosed spots and masses of gelatinous-like exudation, in patches scattered here and there over the mucous surface. *Peyer's patches* were more or less loaded with exudation, the two lowermost being extensively ulcerated. The solitary glands of the ileum, also those in the vicinity of the ileo-colic valves, were the seat of exudation, and some of them were in a state of slough, the mucous membrane throughout being generally thin and wasted. *The Colon* was the seat of numerous small ulcers arranged in regular lines throughout the sacculi of the gut. An extensive deposition of black matter existed throughout the mucous membrane, and was especially remarkable round the solitary glands. The ulcers appeared in a healing state, the mucous membrane around them being soft and free from vascularity. No dysenteric exudation existed. Towards the rectum there was much thickening of texture with some exudation and ulceration, the result of a dysenteric process. On microscopic examination, the gelatinous exudation was found to be composed of hyaloid elements, enclosing numerous blood discs, while the exudation in the glands was, for the most part, made up of granular amorphous matter, no cellular elements being visible. The specific gravity of the mucous membrane not affected with exudation, both in the colon and in the small intestine, was 1·038. *Kidneys.*—They were large, turgid, and soft, the cortical portion comparatively enlarged, and of a coarse granular appearance. Weight respectively, right, 6 oz.; left, 5½. Specific gravity, 1·040. *Spleen*, weight, 5 oz., condensed with irregular masses of exudation, of a bloody appearance. Specific gravity, 1·052 to 1·059.
Private Robert Irvine, aged 19	93rd	3,560	Admitted under the head of "Febris C. C." Death and examination on the 9th of December, 1855. Thermometer, 56°. *Cranium.*—Much congestion of the cranial sinuses was found to exist.

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private Robert Irvine, aged 19—*continued*	93rd	3,560	*Thorax.*—Extensive vesicular bronchitis of both lungs throughout. *Abdomen.*—The mucous surface of the small intestine was covered with patches of bright red congestion; Peyer's patches were prominent in the upper portion of the gut, and extensively ulcerated towards the cœcum. These ulcers were large, with dark edges, and many of them covered in the centre with a tawny slough. A few small ulcers existed in the rectum.
Corporal Fred. Sargent, aged 25	13th	1,746	Admitted on the 1st of December, and died on the 10th of same month, having been nine days in hospital. Reported under the head of "Common Continued Fever." Examination on day of death. Thermometer, 56°. *Cranium.*—Nothing of note; brain and membranes healthy. *Thorax.*—Scattered spots of lobular pneumonia existed in both lungs. The pulmonary tissue generally was affected with vesicular bronchitis. *Abdomen.*—The mucous membrane of the intestines, from the lower third of the jejunum down, was highly congested, with marked prominence of Peyer's patches. Throughout the lower third of the ileum these patches were all ulcerated, with great congestion of the mucous membrane surrounding them. *The Mesenteric glands* were much enlarged. *Spleen* much enlarged, soft, and easily broken down.
Trumpet-Major Thos. Johnston, aged 34	12th Lancers	1,458	Was admitted to hospital on the 30th November 1855, and died on the 22d of December. The case was reported as "Common Continued Fever." The body was examined on the day of death, the thermometer being 52°. *Cranium.*—There was much congestion of all the sinuses of the cranium, opacity and thickening of the arachnoid, with considerable effusion of serum underneath it; congestion of the vessels of the pia mater, and some fluid in the lateral ventricles. *Thorax.*—A few old adhesions existed in the pleuræ of the left side. The mucous membrane of the bronchial tubes was greatly congested. *Abdomen.*—General livid congestion of the intestinal mucous membrane generally. Peyer's

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Trumpet-Major Thos. Johnston, aged 34—*continued*	12th Lancrs	1,458	glands were prominent, but no ulceration was found. *The Mesenteric glands* were enlarged.
Private Luigi Calaptesta, aged 25	L.T.C.	. .	Admitted on the 12th, and died on the 27th of December. Examination of the body on the same day. Thermometer, 58° in shade. *Cranium.*—A cyst-like cavity existed in the anterior lobe of right cerebral hemisphere, about an inch cube, and filled with a yellow gelatinous fluid, some dense ligamentous bands running across it. The surrounding cerebral structure was healthy, and there was no affection of the contiguous bone. The arachnoid was opaque, with effusion underneath. Pia mater congested; excess of serum in the ventricles, and congestion of the choroid plexuses. *Thorax: Lungs.*—Extensive sero-purulent effusion into the cavity of the left pleura; left lung bound down by partially organised lymph. Patches of lobular pneumonia throughout right lung. *Abdomen.*—General congestion of the intestinal mucous membrane existed. Peyer's patches were extremely ulcerated, the ulcers being large and circular, with dark coloured bases and raised edges.
Private Nicholas Flint, aged 28	13th L. Dragns	1,758	This case arrived at Scutari from the Crimea on 16th September. On admission diarrhœa was the most urgent symptom, combined with great thoracic oppression. The marked features of typhous fever, with a papular eruption over the abdomen, chest, and thighs, rapidly expressed themselves; and delirium, with extreme prostration, preceded death, which took place suddenly five days after admission. The case was returned as "Catarrh." Examination on 21st September. Thermometer, 63°. The body was not much emaciated; but the sub-cutaneous veins were very marked throughout their course, from the changed and decomposing blood which they contained. *Cranium.*—The brain and its membranes were highly vascular. Weight of brain, 51 ounces. The specific gravity of the cerebellum and pons varolii was 1·040, of central ganglia 1·035. *Thorax.*—The lungs were œdematous, and did

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private Nicholas Flint, aged 28—*continued*	13th L. Drags.	1,758	not collapse to the usual extent; they were crepitant throughout, but irregularly congested through their substance; in some places the congestion amounted to actual engorgement, accompanied with softening and great friability of the tissues. The bronchial membrane, through its whole course, was red and moist from the larynx to the ultimate ramifications, and the mucous glands of the larynx and trachea were loaded with exudation. The *Tonsils* were greatly enlarged, their follicles being distended with an exudation in all respects similiar, in general and microscopic appearance, to that in the glands of Peyer, consisting of granular and cellular elements of very irregular forms and variable size. Their specific gravity was 1·047. *Abdomen.*—The mucous membrane of the small intestine exhibited a highly livid congestion throughout. *Peyer's patches* were the seat of the most extensive morbid processes. They were loaded and even distended with exudation, throughout their whole extent. Their follicles were prominent with soft exudation, and loaded blood-vessels were seen ramifying through the substance of the patches. The exudation consisted of very fine granular matter, with coarse cells of irregular shape and size. *The Spleen* appeared of the usual volume, but was soft; its section showed the parenchyma of a pulpy consistence and dark mulberry hue. *The Kidneys* were enlarged, and weighed respectively, the right 4¾, the left 5 ounces. Their surfaces were congested, and the cortical part appeared tumid and coarse. The pyramids were compressed, and had a bloodless whitish appearance towards the calyces, while the mutual margin of the tubular and cortical portions was highly congested. A granular fatty exudation was seen, on microscopic examination, to fill the tubes, which were irregularly varicose. The specific gravity of the cortical portion was 1·053, of the pyramidal, 1·051. *The Mesenteric glands* were enlarged and softened within their capsules. Their microscopic elements consisted of granules, cells, and softened molecular matter. Their specific gravity was 1·050.

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private Peter Skinner, aged 28	71st	3,375	This patient arrived with a number of invalids from the Crimea on 4th July; died on 7th. This case was returned as "Febris C. C." Examination on 7th. Considerable emaciation existed, with marked change in the blood of the superficial veins. *Cranium.* — The parts were normal. *Thorax.* — The lungs were highly congested posteriorly, and the pulmonary substance friable throughout, no limited exudation being apparent. The blood in the heart and great vessels was fluid, and dark in colour; and the heart itself was soft and flabby. *The Bronchial glands* were enlarged, and the bronchial mucous membrane of a red hue, and coated with viscid frothy mucus. *Abdomen.* — General enlargement of the mesenteric glands, with livid congestion of the mesentery and intestines. The glands were surrounded with an increased quantity of blood-vessels tending towards them in a highly injected state. *The Small intestines* appeared contracted, and of a dark hue. There was general vascularity over the mucous surface, and all of Peyer's patches were in a state of intumescence with exuded material. In three of the patches the exudation had softened, and ulceration was established. *The Kidneys* were congested, and the cortical substance enlarged.
Col.-Serg. Wm. Warrens, aged 31	77th	1,806	This patient had arrived some time previously from the Crimea, where he was said to have had fever. Death took place suddenly. The case was returned as "Febris C. C." Examination on June 18th. The body was comparatively robust. The course of the superficial veins was marked on the skin by the fluid and dark-coloured blood which they contained, and which had undergone change. *Cranium.*—The arachnoid membrane was much thickened, it was also opaque, and there was considerable increase in the subarachnoid fluid, both among the convolutions and at the anterior and posterior subarachnoid spaces. The substance of the *Brain* was firm and healthy. *Thorax.* — The areolar tissue throughout the mediastinal spaces, and especially that surrounding the great vessels passing to and

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Col.-Serg. Wm. Warrens, aged 31—*continued*	77th	1,806	from the heart, was infiltrated with an abundant sero-purulent exudation. *Lungs.*—The right lung was adherent to the parietes, more especially towards the apex. The pulmonic substance was in parts condensed, and in parts softened; the posterior portions were greatly congested. A section through the pulmonary substance showed granular exudation of a dull grey appearance, which in some parts seemed to be purulent. The left lung was healthy in texture, but much compressed upwards and inwards, towards the dorsal vertebræ and angles of the ribs. A cavity, circumscribed by new formations, extended across from the pericardial reflection at the root of the lung to the opposite costal wall of the left side, containing a large quantity of purulent fluid. Purulent and lymphy exudation coated the pleural surface of the lung. *Heart.*—This organ was healthy, and contained firm decolorised clots of fibrine. *Abdomen.*—In the small intestine remains of ulceration were visible throughout most of Peyer's patches; a few of them were surrounded with a highly vascular ring of congested blood-vessels. Where ulceration had not destroyed the texture of the gland patch, its surface was marked with distinct rings of black deposit, giving the appearance of a number of black dots, corresponding to the follicular apertures to the gland vesicles. A lens of low power rendered these openings visible. The mucous membrane of the gut appeared otherwise healthy. *Kidneys.*—The tunics were easily separable from the surfaces of these organs, exposing a soft, flabby, granular surface, marked with stellate congestion. The kidneys were not increased in size, but relatively the cortical substance was much swollen, and had a coarse granular texture, with here and there a deposit of yellowish substance in the tubes.
Samuel Tannahill, aged 26	5th D.Gds.	1,285	This patient arrived from the Crimea in a very weak and emaciated state on the 20th of September. He continued in a low feverish condition for some time after admission, and suffered much from vomiting of an almost purely bilious fluid. For the most part he lay on his face, and appeared not to be sensible to pain on pressing any part of the abdomen. A scorbutic-like eruption was visible on the legs. He remained much in the same

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Samuel Tannahill, aged 26—*continued*	5th D.Gds.	1,285	state, the vomiting being the most troublesome symptom, till the 7th of October, when severe diarrhœa set in, with aggravation of the febrile condition, and he gradually sank. Death took place on the 12th of October, twenty-two days after his arrival at Scutari. The case was returned as "Febris C. C." Examination on day of death. Thermometer, 63°. The body was greatly emaciated. Scorbutic marks and blood stains appeared on the skin in the course of the superficial veins. *Thorax.* — The lungs were nearly crepitant throughout. The right was engorged posteriorly and friable. The heart was small; the blood, fluid and dark, both in its cavity and in the great vessels. *Abdomen.* — The mesenteric glands were enlarged throughout the whole extent of the mesentery; their specific gravity was 1·043. Intus-susceptions existed at three different places throughout the course of the small intestines, but no lesion of an inflammatory type was to be seen, either on the peritoneum or in the substance of the intestine at these parts. These appearances, probably, came on at the moment of death, or immediately after it, and they have always been seen in those cases in which there has been great pain during life, and ulcerations in the bowel have been found post mortem. The *Intestinal mucous membrane* throughout was thin and wasted, congestion with ecchymosis being visible at different parts on its surface; its specific gravity was 1·037. The stomach also was similarly congested, thin, and worn. *Peyer's patches* looked as if abraded, showing ecchymosed spots on the site of the gland substance, with melanotic deposit and ulceration. The specific gravity of Peyer's patches, when congested and turgid, was 1·044. *The Colon* throughout was studded with small ulcers, confined chiefly to solitary gland spots, while the general substance of the mucous membrane was thin and worn. No evidence of the dysenteric process existed. The specific gravity of the mucous membrane of this intestine was 1·039. On *microscopical examination*, the mucous membrane of the small and large intestines was in a state of atrophy from wasting of the follicular glands, whose contents appeared

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Samuel Tannahill, aged 26—*continued*	5th D.Gds.	1,285	granular; there was also general granular and fibroid degeneration of the mucous tissue. *The Kidneys* weighed respectively, right 5½, and left 5¾ ounces. Venous congestion on the surface. The capsule peeled off easily at some points, and there was also congestion of the general parenchyma. The cortical part was tumid, but without any definite deposit.
Private Jos. Cutts, aged 22	38th	3,583	This case was received into hospital at Scutari on the 26th of September, 1855; having been three weeks in hospital in the Crimea, where he is stated to have had diarrhœa. After admission he had occasional epistaxis, with much fever and hurried respiration. On admission increased heat was appreciable over the abdomen, with tympanitic distention. About three days after admission pneumonic symptoms were manifested, the sputa presenting the "rusty" appearance for one day. The thoracic oppression became more severe, and during four or five days before death the fæcal discharges were of a black and tar-like nature. His pulse became tremulous, rapid, and thready; the abdomen continued hot, but the patient was unconscious of pain.* He replied to questions by short, abrupt answers. His countenance became pale, pinched, and anxious, and he died on the 14th of October. Post-mortem examination about six hours after death. Thermometer, 65°. There was great emaciation, with rapidly advancing decomposition of the body, the blood being greatly changed in the superficial veins; air or gas was already present in the areolar tissue. *Thorax.* — The pericardium contained an increased quantity of bloody serum. *Lungs.* — Extravasation of blood had taken place into the pulmonic tissue of the right side to a very marked degree. On the left side the lung was adherent, and the substance of both was greatly gorged, especially on the posterior aspect. They were soft and friable throughout. A dark clot of blood was found in the heart; decomposition of the blood had rapidly advanced, and the tunics of the large arteries were dyed from its colouring matter. *Abdomen.* — The mucous membrane of the small intestine was thin and wasted, the lowermost patches of Peyer being ulcerated to a great extent, while the remainder

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private Jos. Cutts, aged 22—*continued*	38th	3,583	throughout the ileum and jejunum were in various states of infiltration and softening, with great injection of the blood-vessels round the margins of the patches. The specific gravity of three was taken; they were respectively 1·032, 1·036, 1·039. *The Liver* was soft, with marks of degeneration irregularly scattered over the greater lobe. The weight was 43 ounces; its specific gravity, 1·020. *Spleen* large; specific gravity, 1·048, with extensive subcapsular deposit, of a yellow, soft texture, and granular. *The Kidneys* were in the state of cortical engorgement, and weighed respectively, the left 5½ ounces, the right 5¼ ounces.
Corporal Richard Toogood, aged 28	4th L.Drgs	. .	Only nine months' service, sent sick from the Crimea, and admitted to hospital on 2nd Sept. 1855. The case was entered as one of "Diarrhœa." The day after his admission he voided five or six thin but fæculent stools, without blood or mucus. There was great general weakness and emaciation. By a medical board of the 16th September, he was invalided and ordered to be sent to England, but on the 21st feverish symptoms were again established with marked severity; frontal headache, delirium, and rapid pulse were the most marked features; coma supervened, and death took place on the 24th, three days after this febrile accession. Examination was made on the 25th. Thermometer 65°. The body was greatly emaciated. *Thorax.* — Extensive pleural adhesion existed at the right side. There was much general engorgement of the pulmonary tissue, its substance being friable. The lung was crepitant throughout, a small portion towards the apex and anterior edge alone excepted. *Heart.* — Healthy; blood fluid and dark in the heart and great vessels. *Abdomen.* — The spleen was enlarged, soft, and of mulberry-like hue. *The Kidneys* were congested, and presented great relative enlargement of the cortical substance. They weighed respectively, the right 4¾ oz., and the left 5 ounces. Excessive enlargement of the *Mesenteric glands*, with softening in some of them, was observed. An intus-susception existed in the small gut, without any inflammatory action.

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Corporal Richard Toogood, aged 28—*continued*	4th L. Drgs	. .	The general surface of the mucous membrane was highly vascular. *Peyer's patches* throughout were in various stages of morbid action. Towards the lower part of the ileum more especially, ulceration had advanced in the glands to a considerable extent, leaving in some parts a clear reticulated appearance, like what remains after the aphthous sloughs of follicles have separated. Towards the upper portion of the intestine the patches were gorged with exudation, but had not yet commenced to break up or ulcerate.
Lance-Corporal Geo. Euston, aged 26	90th	2,587	This patient was said to have had dysentery after fever in the Crimea; died at Scutari, October 16th; case entered as "Common Continued Fever." Examination on day of death. Thermometer, 68°. *Thorax.* — Pleural adhesions on the right side; the posterior half of this lung was consolidated, and the bronchial tubes were filled with fluid exudation. In the left lung the ultimate air-cells appeared to be distended so as to form lobular nodules, filled with exuded matter, throughout the substance of the lung tissue. The *Pulmonary artery* contained a fibrinous coagulum, extending to the finer ramifications of the vessel. *Abdomen.* — The omentum was adherent by extensive old vascular connections. The stomach was highly vascular on its peritoneal surface. The mesenteric glands throughout were excessively enlarged, and some of them softened: their specific gravity was 1·039 to 1·042. *Small Intestine.* — Peyer's patches were universally implicated, and had commenced to ulcerate at the lower part of the gut. The specific gravity of these patches was ascertained to be 1·038 to 1·042. Partial peritonitis had existed, corresponding to one of Peyer's patches in the jejunum, where perforation had almost taken place. A thin and worn condition of the mucous membrane, both in the colon and small intestine, was found associated with a general atrophy of the follicular glands. The specific gravity of the thinned portion was 1·037. *Colon.* — there existed extensive ulceration, the remains of an old dysenteric process, in this intestine. Its mucous surface was sprinkled

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Lance-Corporal Geo. Euston, aged 26—*continued*	90th	2,587	over with a considerable amount of melanotic deposit. *The Spleen* was soft and flabby, weighing 8 ounces. Its specific gravity was 1·058. *The Liver* was of large size, was soft and flabby, and weighed 60½ ounces. Its specific gravity was 1·054. *Kidneys.*—The right weighed 5¼ ounces, the left 5½ ounces. There was a great enlargement of the cortical substance, and much congestion around the pyramids, with venous congestion on the surface, and softening and adhesion of the tunics. Their specific gravity was about 1·037.
Private Joseph Hewins, aged 30	10th Husrs.	1,168	Admitted to hospital on the 2nd of August, and died on the 24th of the same month. He was reported as a case of "Common Continued Fever." The examination was made on the day of death. Thermometer, 81°, *Cranium.*—The brain and membranes healthy. *Thorax.*—Heart and lungs healthy. The lesions were chiefly intestinal. *Abdomen.*—The mucous membrane of the small intestines, and especially the ileum, exhibited numerous scattered points of depressed ulceration, about one-sixteenth of an inch in diameter; on the outside of these ulcers a deep ring of congestion, of a blackish red colour, was observable. Towards the cœcum these ulcers increased in size and frequency. Posterior to the cœcum there was a large abscess filled with fœtid grumous pus, which extended from the vermiform process (which itself adhered to the cœcum) to the middle of the ascending colon, being imbedded in the sub-peritoneal tissue.
Private Moses Ewens, aged 23	44th	2,929	This patient had but recently arrived from the Crimea, where he had been long sick. The case was returned as "Diarrhœa." Death and examination on the 14th of September. Thermometer, 69°. There was general yellowness of the skin and viscera. *Thorax.*—The pulmonary tissue was œdematous, but presented the usual collapse of the lungs on opening the cavity of the pleuræ. There was also much congestion towards the posterior part of the lungs, which presented here and there blue livid patches over the surface of the pleuræ. Exudation of blood had oc-

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private Moses Ewens, aged 23—*continued*	44th	2,929	curred here and there into the tissue, and constituted large so-called apoplectic clots. *The Heart* was soft and flabby. *Abdomen.*—The peritoneal surface of the ileum was of a dark purple colour, especially remarkable towards the cœcum. Peyer's patches throughout were for the most part bare and worn away. In one a small circular mark, with a smooth skin-like surface, showed the remains of a perfectly healed ulcer. Extensive congestion existed round the margins of all the patches, and the mucous membrane generally exhibited on section a good deal of follicular wasting. Patches of ecchymoses also covered the surface of the stomach, which was thin and worn, and much contracted. *The Colon* was thin, its solitary follicles distended with exudation, which consisted of fine clear nucleated cellular elements, surrounded with great vascularity. *Kidneys.*—The right increased to nearly twice its volume, weighed 10 ounces; the left less, but weighed 8½ ounces. The enlargement was considerable, but irregular in both, the cortical substance being excessively swollen, with a coarse granular appearance and great congestion of the pyramids. *The Mesenteric glands* throughout were enlarged.

TYPHOID FEVER,

ASSOCIATED WITH OTHER DISEASED PROCESSES.

Private Frank Osborne, aged 24	13th L.Drgs	. .	Admitted 4th of September, and died 27th of same month, having been 23 days in hospital; case reported as "Common Continued Fever." The body was examined on the day of death. Thermometer, 63°. *Cranium.*—Some serum was found effused under the arachnoid; the vessels of the pia mater were greatly congested. The lateral and third ventricles were distended with serum. *Thorax.*—Capillary bronchitis prevailed throughout both lungs, with spots of lobular pneumonia, and a few miliary tubercles in the apex of the left. *Abdomen.*—Ulcerations of Peyer's glands were common throughout the gut, involving all the tissues, and extending close to the peritoneum;

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private Frank Osborne, aged 24—*continued*	13th L.Drgs	. .	the ulcers increased in size and number as they approached the cœcum. In the large intestine, small ulcers with dark red edges were dotted through the entire tract of the mucous membrane.
Private William Revil, aged 19	3rd Buffs.	3,017	Admitted on the 10th of September, and died on the 3rd of October, having been 22 days in hospital; reported to have "Common Continued Fever." Examination on the day of death. Thermometer, 62°. *Cranium.*—Much serum was effused under the arachnoid; and the vessels of the pia mater were greatly congested. The ventricles were also found greatly distended with serum, about 6 ounces. There was considerable congestion of the choroid plexus. *Thorax.*—The anterior and superior portions of both lungs were affected with vesicular bronchitis, the posterior and inferior parts being in a state of hepatisation, the exudation extending to the centre of either organ. *Abdomen.* — Throughout the upper half of the small intestine, Peyer's patches were greatly congested, and of a dark red colour; in the lower half, these glands were converted into large ulcers, with thickened edges of a brown colour, depressed centres, and reddish sloughs at the base, the tissues being destroyed in some instances down to the peritoneum. Some old dysenteric ulcers existed in the colon.
Gunner James Leister, aged 22	R. A. 3d Bat. 6th Comp.	. .	Admitted to hospital 10th of December, and died 29th of December. This case was returned as "Dysenteria Chronica." Sectio cadaveris on the day of death. *Thorax.*—The lungs showed extensive vesicular bronchitis, with general hypostatic congestion. *Abdomen.*—The lower fourth of the ileum exhibited a state of very livid congestion, and close to the ileo-cœcal valve there was one large patch of ulcerated glands, involving at least three inches of the gut. These ulcers had raised edges, with a brown slough in the centre, and were of an oblong shape. Throughout the colon and rectum the entire mucous tract was studded with numerous ulcers, laying bare in some places the peritoneum. The mesenteric glands were much enlarged.

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Driver James Cooke, aged 25	R.H.A. A Trp.	. .	Admitted to hospital on the 28th of July, and died three days after admission. The case was reported as "Febris Remittens." The body was examined 1st of August. Thermometer, 91°. *Cranium.*—Parts healthy. *Thorax.*—Parts normal. *Abdomen.*—In the small intestines the upper portions of the jejunum and ileum appeared healthy, but the mucous surface of the rest of the ileum was congested, especially in the vicinity of Peyer's patches, which were in a state of extreme ulceration, and of a dark red colour. The ulcers varied from one quarter to two-thirds of an inch in diameter, had greatly thickened edges, and in many places had destroyed the muscular coat, and on the peritoneal aspect of the gut yellow lymphy exudation was effused. *Colon.*—Ulcers, the remains of an old dysenteric process, were visible in the lower part of this intestine. The mesenteric glands were considerably enlarged.
Private Edward Beeley, aged 20	19th	3,303	Admitted on the 28th of August, and died on the 12th of September, fifteen days after admission: case reported as "Common Continued Fever." The body was inspected on the day of death. Thermometer, 81°. *Cranium.*—Parts healthy. *Thorax.*—At the posterior part of the upper lobe of the right lung the pulmonary tissue was extremely hepatised, numerous spots of lobular pneumonia also being here and there scattered through the substance of the organ; much congestion, with frothy serum, pervaded the lung generally. *Abdomen.*—Throughout the ileum there were numerous and extensive ulcerations of Peyer's glands, very various in dimensions, pale in colour, and with thickened edges. They were covered with a yellow tenacious slough. In the *Colon* large ulcers existed throughout its whole tract: they were of old standing, pale, and as if punched out of the mucous membrane. *The Mesenteric glands* were enlarged, and of a bluish-red colour.
Private James Walton, aged 26	18th	3,372	Was brought to Scutari from the Crimea, a convalescent from typhoid fever. At that time his stools contained a great deal of blood and mucus, were frequent, copious, of a liquid

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private James Walton, aged 26—*continued*	18th	3,372	nature and brown colour, "pea-soup" coloured. This condition was partially checked, but, returning with more or less violence at irregular intervals, he at last sunk, about four months after his arrival from the camp. The case was returned as "Febris C. C." Sectio cadaveris was made on the 19th of July. Thermometer, 74°. The body was excessively emaciated, and large bed sores existed over both trochanters. *Cranium.* — The brain appeared somewhat shrunken under its coverings, which were wrinkled over the convolutions, notwithstanding an extensive sub-arachnoid effusion of clear serum. The pia mater was injected to a great extent, and not easily separable from the cerebral surface. *Thorax*——The lungs were healthy, but the heart was small and atrophic. *Abdomen.*—The patches of Peyer throughout the small intestine were the chief seat of morbid action. The upper sets bare and atrophied, those in the middle part still tumid with exudation, while those lower down in the ileum, especially towards the colon, were in various stages of ulceration, and surrounded with rings of great vascular injection. *The Colon* throughout was very much contracted. Extensive ulceration prevailed at the lower part of the sigmoid flexure, combined with diphtheritic exudation towards the caput cœcum. There was also great thinness and wasting of the mucous membrane of the large intestine, with intumescence of the solitary glands, surrounded by a highly vascular circle of congested vessels. *The Mesenteric glands* throughout were greatly enlarged, with much congestion of those in the region of the ileo-colic valve and head of the cœcum.
Private James Gillings, aged 24	1stBat. R. B.	. . .	Arrived from the Crimea on the 27th of July; this patient died nine days after admission into hospital. This case was returned as "Diarrhœa." Examination on day of death. Thermometer, 80°. The body was much emaciated. *Thorax.* — The blood in the heart and large vessels was fluid and dark. The heart was flabby and soft. *The Lungs* were marked throughout with much congestion, more or less hypostatic. The pulmonary substance was generally friable.

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Private James Gillings, aged 24—*continued*	1st. Bat R. B.	. .	Exudation of large and dense masses was scattered here and there throughout the substance of the right lung, and some of these masses were apparent on the pleural surface by a bounding line of irregular shape and livid hue, and by opacity of the pleura. Microscopically, this exudation consisted of large irregular, broken-down cells and granules, with granular epithelial-like secretion. *Abdomen.*—There was much congestion of the omentum and mesentery, with general enlargement of the mesenteric glands. The mucous membrane of the *Small intestine* was highly injected, especially throughout the ileum; Peyer's patches were ulcerated throughout, those of the upper part of the intestine being more in the softening than in the ulcerating stage, while in the lower part the process of ulceration was completely and extensively established. The *Large intestine* also was the seat of ulceration in its whole extent, which seemed to be more or less the result of an old dysenteric state. The kidneys were enlarged, and highly vascular; their cortical substance was soft and swollen.
Private Fred. Pike, aged 22	L.T.C.	2,997	Admitted on the 11th of December and died on the 16th, having been only five days in hospital, the most urgent symptoms being dysenteric. Examined on day of death. Thermometer, in shade, 39°. *Cranium.*—There was much congestion of the membranes of the brain, with effusion into the ventricles. *Abdomen.*—Peyer's patches were prominent throughout with exudation, but ulceration was only established in those of the lower half of the ileum. In this part all the ulcers were extensive, surrounded with greatly congested vessels. They were generally large, circular, and shallow; of a brown colour, with elevated margins. They were most numerous close to the colon. The entire tract of the *Mucous membrane* of the large intestine was covered thickly with large deeply excavated ulcers, of a greenish-black hue, and with a red centre. The mucous membrane generally appeared to peel off without any difficulty. In the *Rectum* extensive large black ulcers were found; but little trace of the mucous membrane was left. The mesenteric glands were much enlarged.

Name of Patient.	Regt.	Regimental No.	Summary of the History of the Cases, and of their chief Post-mortem Appearances.
Sergeant Wm. Jeaffrey, aged 22	72nd	2,766	Admitted on the 2nd of December 1855, and died on the 22nd of the same month, having been twenty days in hospital. The case was reported as "Common Continued Fever." Post-mortem examination on the day of death. Thermometer, 52° in shade. *Cranium.*—There was great congestion of the vessels of the pia mater, of the sinuses, and of the choroid plexuses. The lateral ventricles were distended with serum. *Thorax.*—A few old adhesions of the pleuræ existed on the left side. The posterior part of the right lung was hepatised, and the left was affected extensively with vesicular bronchitis, the tubes being filled with frothy serum. *The Heart* was large, pale, and flabby. *Abdomen.*—Peyer's patches were in various states of morbid action. They were prominent above; and towards the lower portion of the ileum, they were extensively ulcerated, the ulcers being of circular form, and of a glossy red hue, with now and then an ash-coloured slough at bottom. The *Colon and Rectum* were the seat of numerous long fusiform dark-coloured ulcers. *Kidneys* greatly enlarged; weight of right 10½ ounces, of left 13 ounces. They were soft, mottled on the surface, of a mixed red and yellow hue, the capsule easily detached; cortical portion, coarse, granular, and enlarged; tubular part deeply congested. *The Spleen* was large, soft, and easily broken down.

CHAP. IX.

YELLOW FEVER.

ORDER I.—*Primary Fevers.* CLASS III.—*Remittent Fevers.*

HAVING concluded in the last chapter the description of the Continued Fevers, it would be our duty next in order to enter on the consideration of the Intermittent Fevers, which constitute the second class of the first great order of Fevers, namely, the PRIMARY FEVERS, according to the arrangement of the several varieties of Fever which we adopted in a former part of this work. (See Chap. iii. p. 42.) As, however, it is not within the scope or limits of this volume to treat of this class of Fevers, we shall pass on to the study of one remarkable example of the fevers of the third class, or those of Remittent type.

Yellow Fever is usually classed with the diseases of Remittent type, and in all essential particulars this is certainly the group of febrile affections to which it presents most affinity. As we shall subsequently have occasion to notice, however, Yellow Fever is in certain epidemics marked by a tendency to divide itself into distinct and separate stages, rather than by any characters of daily remission of the pyrexial phenomena. Yet in accordance with general usage, we shall continue to retain it in the category of Remittents until Nosologists define its place.

GENERAL CHARACTERS OF YELLOW FEVER.

Dr. Aitken defines this disease as follows:—"*Topographically, it is a disease not proved as yet to be one* sui generis, *endemic only in low districts on the sea coast, but under certain circumstances sporadic in other places, never appearing beyond* 48° *of north latitude, nor without a temperature of* 72° *at least, somehow promoting its propagation and production, nor above the elevation of* 2,500 *feet above the level of the sea.*"

At what historic period yellow fever became an established epidemic, it may perhaps be not possible now to determine. Some writers, and amongst them Bancroft, seem to think that certain of the fevers described by Hippocrates as being attended with black vomiting and yellowness of the skin, were of the same nature as the yellow fever of later times. I doubt much that the question admits of absolute solution, so meagre are the accounts left us in the fragments of the works of the great father of medicine.

Regarding this formidable epidemic in a general way, with a view to the determination of its leading nosological features, it presents all the characters of a well-marked fever.

The nervous system is oppressed, the circulation highly excited, while the secretions are diminished in quantity, altered or suppressed. The temperature is elevated, the skin hot and dry to the touch, and the thermometer in the axilla indicates an increase above the natural standard frequently to the extent of two, four, and sometimes even six degrees Fahrenheit.

The sensorial functions are but comparatively little affected on the whole, and it is common for patients to retain possession of their faculties till shortly before death; exceptions, however, occur to this rule, and cerebral excitement, with delirium and other head symptoms, has been observed in a certain number of cases in all epidemics.

It is often difficult to reduce the disease to any distinct type of febrile action. Occasionally the fever will be found to occur with such characters that, strictly speaking, it does not correspond to any of the regular types of continued, intermittent, or remittent fever; the phenomena are, undoubtedly, perfectly continuous in numerous cases for days together; intervals also occur in which the patient is devoid of pyrexial excitement of any kind, but these intervals are irregular in their periods of occurrence, and not by any means constant, and they are certainly wanting in any definite character of periodicity. In my judgment, the disease will be best described as a fever composed of distinct stages or periods; the chief characters and the order of occurrence of which, though by no means constant and uniform, observe much regularity in the majority of the cases in certain epidemics.

The cases of yellow fever resolve themselves naturally into certain groups, more or less distinguished from each other by the presence or absence of well-marked and characteristic clinical features.

Amongst the groups thus distinguishable from each other the following are, perhaps, those best marked and most readily recognisable in the history of different epidemics :—

I. THE ALGID FORM.
II. THE STHENIC FORM.
III. THE HÆMORRHAGIC FORM.
IV. THE PURPURIC FORM.
V. THE TYPHOUS FORM.

The algid form is, generally speaking, that which presents the most rapid course, the earliest and greatest amount of prostration of the vital powers, and which, likewise, offers in most frequent combination the most appalling characters of the epidemic reunited in individual cases.

In many epidemics the mode of invasion of the disease and its suddenly fatal effects have given to it peculiar and distinguishing features, so as almost to entitle it to be considered a separate form of the malady. The patient, while in the enjoyment of his usual health, and in the midst of his usual occupations, feels suddenly the effects, as it were, of a sudden blow from a heavy bar on the back, falls down while walking, and dies within a few hours in profound collapse, and after exhibiting more or less of the other symptoms of the fever.

I am not aware of the occurrence during any portion of the Lisbon epidemic of 1857 of this class of rapidly fatal cases, vernacularly known elsewhere as "walking cases;" and though rachialgia was a common symptom, I did not observe nor hear of its occurrence in that intense form accompanied with sudden prostration of the vital powers, and rapidly fatal issue, known so constantly in the older epidemics as *coup de barre*, or stroke of the bar, from the marked cases in old men and also in boys, in young girls of fifteen to twenty, and in old women of sixty.

This class of cases presented extreme and, in general, early and marked prostration of strength. Taking a case in which the algid condition was fully developed, the following appearances were observable: —

The countenance was sunken, the eye dull and filmy, the surface was cold, and the patient felt cold, wretched, and depressed, and cowered under the bed-clothes; in extreme cases the teeth chattered, and even marked general rigors were sometimes observable. The face was of a dirty livid hue; this appearance extended to the trunk, which, as well as the remainder of the body, often presented innumerable points of minute venous congestion; the extremities, and especially the hands and feet, were deeply livid, blue, and cold. It was not uncommon in such cases to find the skin thickly covered with purpuric spots and patches of various sizes. Sometimes there was an universal semi-cyanotic condition of the surface observable, not very dissimilar to that with which we are familiar in the algid period of cholera. In extreme cases the lips, the breath, and even the tongue, were cold, and in some instances we determined the temperature in the axilla at 96° Fahr., indicating a diminution of 2° in the animal temperature. The pulse was small, feeble, and quick, but it did not present any very constant characters. In extreme cases the radial pulse was obliterated, and the cardiac action became extremely feeble.

It is not to be supposed that these features were exhibited only at the outset of the attack, or for a short period subsequent to the invasion of the disease.

They were not necessarily immediately developed in all the cases subsequently assuming the algid form; and in some instances a day or more elapsed after the primary attack of headache, rachialgia, gastric anxiety, or any of the other symptoms which all or singly marked the commencement of the disease, before the algid phenomena were presented. As a general rule, these symptoms were of all but fatal augury, and continued little altered, if not aggravated, till the final issue of the case in death. Many of these cases might almost be considered as purely apyrexial; for, with the exception of slight elevation of temperature in internal parts, and the depression of the nervous system, there was nothing whatever to indicate that the organism was undergoing a process of febrile action.

Pains in the calves of the legs appear to be much complained of in many cases of yellow fever at the outset, and they are often the cause of much suffering in the algid as well as in other forms of the disease.

In a very large proportion of cases of the algid form, the hæmorrhagic tendency was present to the most marked degree; this was evidenced in the several following particulars:—

(*a*) By the early and profuse development of purpuric spots and occasionally of purpuric patches of variable size on all parts of the surface. These spots were especially well developed on the chest and neck in females, and upon the lower extremities in both sexes. Bloody furuncles are occasionally presented on the skin in certain epidemics.

(*b*) By distinct hæmorrhages from the nose, from the lips, and gums, and from the stomach, in the shape of black vomit; likewise from the intestines, (1) passed per anum during life, or, (2) found post-mortem throughout a greater or less extent, sometimes through the whole tract of the small and large intestines.

(*c*) Hæmorrhage took place from the vagina in females, and sometimes to a very large extent. These hæmorrhages were in no way necessarily connected with the menstrual period.

(*d*) Bloody streaks and patches were frequently presented in the expectoration; in some cases there was reason to believe that the blood came from the bronchial or pulmonic surface.

In several of these cases the blood crusted in the shape of thick reddish black sordes on the tongue, gums, teeth, lips, angles of the mouth, and alæ of the nose; the patient's face was marked with the blood which continually oozed from the gums, lips, and nose; the hands were likewise stained with blood, and the bed and bed-clothes were not infrequently similarly tinged or smeared with black vomit, all which contributed much to give the patient, as he lay half gathered up and cowering under the bed-clothes, a peculiarly horrifying and appalling aspect, which once seen left an enduring impression on the observer's mind.

Indeed in this, as well as in the other forms of the disease as I observed them, yellow fever has a special and a highly characteristic physiognomy, the salient features of which are readily recognisable and taken in by the practised eye at a glance, though they are very difficult of description; and I believe it to be impossible to convey by any language, however forcible, an adequate idea of them. After a now very extensive experience of the worst forms of epidemic disease at home and in foreign countries, and at the Seat of War, I must avow that I have seen few assemblages of symptoms of a more striking and indeed horrifying character than those often presented in yellow fever cases, nor any in presence of which more impressive feelings are called forth in the reflecting mind.

I have seen many cases the features of which were of a truly appalling character. Not to multiply descriptions, I may cite from my note-book the following brief statement of the chief symptoms presented by a very well-marked algid case.

It was that of a young girl, aged sixteen (Case 22, Female Wards, Desterro Hospital, Lisbon). She was admitted on the 10th of December, 1857, at 10 P.M., having been ill since the 4th. She was described as having exhibited hysteric symptoms on admission. When seen at the hour of visit (9 A.M.) on the 11th, she was still in a profoundly algid state, though all proper means had been used to restore reaction. She lay cowering and shivering under the bed-clothes. She was quite pulseless, the hands and feet were cold, and the hands soiled with blood; the face was of a livid bluish tint, the eyes darkly congested and dull, the alæ of the nose, and the lips, and teeth covered with bloody sordes; the tongue was moist, slimy, and bloody; there was complete absence of yellow coloration of any kind, the surface generally was semi-cyanosed, and everywhere thickly covered with well-marked purpuric spots. Dark blood oozed from the nose and gums, and black vomit supervened, and likewise vaginal hæmorrhage; there was retention of urine. She was still hysterical at the hour of visit, trembling, fearful, and disposed to cry. She retained her faculties of sense, could understand questions and made efforts to reply, but could not articulate. There was but one end for such a case. She died on the following day; the conjunctiva was slightly yellowish, post mortem.

The above description will serve to convey a brief preliminary outline of the most remarkable characteristics of the algid form of the yellow fever; it agrees in all essentials with the descriptions given by other writers.

It will be observed that there has been as yet no mention made of yellowness of the skin or other structures. In fact, this symptom was very often wanting throughout in this class of cases, many of them dying without having ever exhibited a trace of yellowness on any part of the cutaneous surface or even the conjunctivæ during life; its absence being remarkable in these and other situations till after death. For such cases the term *Yellow* Fever was an obvious misnomer, throughout their entire course. Complete and entire absence of yellow discoloration during the whole course of the case whilst life remained, and after death, was however an extremely rare occurrence. Such cases I have undoubtedly seen, and I have verified the observation in every stage up to the period of death and post-mortem examination. It more commonly happened, however, that a slight tinge of yellowness was observable in the conjunctivæ at variable periods, often at only very short intervals of a few hours before death took place. In other cases, and this by no means infrequently happened, the discoloration did not begin to appear till a variable interval after death, and then, commonly presenting itself first in the conjunctivæ, it became gradually visible, spreading from the fairer and whiter parts to the more livid, which latter, as will be more fully detailed in treating of the external post-mortem appearances, it but seldom gained, at least to the extent of giving to them any tinge perceptible through the more striking lividity of the inferior and dependent parts and the extremities.

The clinical history of the algid form, while offering a certain uniformity in its general characters, presented much variety of its phenomena in detail. The sinking, coldness of surface, and depression of the vital powers, were sometimes, as we have already remarked, of early occurrence; but they were undoubtedly to be observed equally well marked at so late a period as the 7th, 8th, or 9th day of the disease. In some instances of patients admitted into hospital on the 8th day from the date of the attack of cephalalgia, rachialgia, and other primary symptoms, the algid condition was very well exemplified. In this class of cases it is, I think, fairly presumable, in the absence of direct proof from actual clinical observation, that the algid state corresponded to a period of more or less complete remission of the febrile symptoms. The pulse was either altogether absent or very feeble, and in some cases it was little, if at all increased in frequency, while the hands and feet were quite cold and blue, the surface generally livid and cold; and the thermometer in the axilla marked in one instance but 97°, in another 96°. In the cases here alluded to the pulse was respectively 80 and 108 in the minute, and very feeble in both.

special importance to those in question. I think, however, that I have observed that such cases as were attended with delirium and other symptoms of cerebral excitement were more rapidly fatal than those in which such symptoms were not presented.

As will be seen from the records of our post-mortem researches, the anatomical states of the cerebrum and its appendages were opposed to the supposition of inflammatory action as a cause of cerebral excitement or other such symptoms during life. Well-marked inflammatory states of the brain and its membranes I have not myself met with; and though slight congestions and slight serous effusions were frequent enough, they did not appear to have any constant or necessary relation to the symptoms of nervous excitement observed before death.

As bearing directly on this part of the subject, I may briefly allude to the following results. I have made careful inspection of the cerebral substance, and the membranes of the brain, in a case presenting delirium during life; and I have found an entire absence of congestion of the cerebral substance, and of serous effusion on the surface of the hemispheres or in the ventricles. On the other hand, distinct evidences of congestion on the surface of the ventricles, the cerebral substance on section showing the sablé condition, and slight effusion of serum, sometimes of a slightly straw colour, at other times of a bloody tinge, have been present in cases which, during life, exhibited no abnormal symptom whatever referrible to the cerebrum.

Gastric phenomena, with anxiety and depression.—Under this head may be comprised a peculiar and very indescribable set of symptoms, half moral, half physical. These symptoms were chiefly referrible to the epigastrium; they may be said to have been made up of a sense of uneasiness, anxiety, and apprehension, with a sinking feel, occasionally combined with nausea, and sometimes with pain more or less severe, but pain was neither a constant nor necessary attendant upon the condition in question. The whole set of symptoms were referrible to the epigastrium as their principal seat, and to this region the patient's chief sufferings were in almost all cases assigned; they are comprised in the French term *Anxiété épigastrique.*"

Practical physicians are, of course, familiar with the occurrence of symptoms of a somewhat similar character in various kinds of affections, especially in those attended with profound abdominal lesion; but under no circumstances have I ever seen them developed to anything like the same extent, or causing the same amount of distress to the patient, as in the several forms of yellow fever, and in none more so than in that now under consideration.

State of the cutaneous surface. — I have already partly described the general condition of semi-cyanosis which was presented in this class of cases. In extreme cases, the face was livid and dusky, the lips bluish, the hands and feet livid and cold, and their integuments shrivelled and wrinkled. The skin was very frequently thickly covered with an eruption of purpuric spots, usually of from half a line to one, two, or more lines in diameter, of a darkish red colour, not disappearing on pressure, and persistent from their first appearance throughout the subsequent course of the disease. We have remarked that the surface was cold, in many cases remarkably so; there was also much depression of the cutaneous vitality, the action of blisters being slow and often imperfect; complete vesication it was sometimes found impossible to obtain.

Absence of yellow discolouration of skin or conjunctivæ.—As already stated, the absence of the symptom of yellowness of the skin, conjunctivæ, and all other parts whatsoever, was sometimes complete throughout the whole course of the case during life; and even, in some few instances, no traces whatever of yellowness could be detected in these parts after death.

This latter, however, was decidedly an exceptional condition; as it generally happened that, though during the entire course of the case, till the last few hours of life, there was a complete absence of yellow colouration in all parts, slight yellowness began to be visible in the conjunctivæ a short time before death. In other cases, in which there was entire absence of yellow colour in all parts during life, it made its appearance soon after death took place; in general being soonest evidenced in the conjunctivæ, and then gradually spreading to other parts; as a rule, the whiter and fairer parts soonest exhibiting the discoloration. It was sometimes confined to the conjunctivæ exclusively; this was often enough the case during life, much more rarely so in the post-mortem state. I am not aware of any instance, either during life or after death, in which this colouration being exclusively confined to any one spot, it selected any other situation than the conjunctivæ in which to be manifested.

Function of respiration.—No appreciable lesion of this function was commonly present. The breathing was not infrequently somewhat quickened, short, and imperfect, and occasionally "thoracic," or limited chiefly to the thoracic walls; this was the case principally in connection with the state of epigastric anxiety above alluded to. Cough, dyspnœa, or thoracic pain, I have not myself observed; and this almost universal absence of thoracic symptoms is not a little remarkable, more especially when we take into account, as will be subsequently evident, the considerable amount of congestive lesions of the lungs so constantly found as a post-mortem condition. Bloody sputa were pretty often observed in the algid as well as in the other forms; but, in consequence of the numerous sources from which blood was exuded, it was often extremely difficult to determine whether the blood came from the lungs or not. In some instances it undoubtedly did.

Function of circulation.—As a general rule, the vascular action was much below par in the algid form. I have observed cases in which the radial pulse was imperceptible for days; more commonly, however, the pulse at the wrist, though excessively feeble, was not altogether obliterated, and by a delicate and practised finger it could be felt and counted. Its rate was variable, more commonly below than above 100 per minute. I have noted it at 80, very fine, thready, weak, and readily extinguishable, and at almost all intermediate rates to 120 with much the same characters.

The cardiac action was very feeble. I have not observed any diminution in the relative proportions of the first and second sounds of the heart; they were often diminished in tone and force, but preserved their relative characters of duration and intensity. I have not observed any want of accordance between the cardiac action and that of the arteries in the algid form, such as I shall have to speak of subsequently, when treating of some of the other forms. In general, in this form, the radial pulse could be taken as a measure of the cardiac action; when the pulse was feeble, the heart was likewise proportionately so. There was no exception to this rule, as far as my experience of these cases goes.

Hæmorrhagic phenomena in the algid form.—We may very properly consider this class of phenomena after those of the circulating apparatus. Amongst those most constantly present we may notice, in the first place, the purpuric spots already more than once alluded to; as far as I have seen, they were all but universally present in the algid condition. The exact period of their occurrence it was not possible for me to determine, as they were invariably present when the patients were admitted into hospital, and equally so, whether this happened at an early or a comparatively late period after the first seizure: we may naturally conclude from this, I think, that they were developed at a pretty early stage of the disease. I have no record of any special character attaching to them; they were, in all respects, precisely similar to the spots of such constant occurrence in the epidemic purpura hæmorrhagica of Ireland, and so often presented in low states of the system in the typhus fever of Ireland, interspersed with the true maculæ of that disease. I have already specified their size at from half a line, to one, two, or more lines; sometimes, but not very commonly, larger irregular patches of purpura of a few square lines in extent were observable.

This occurrence of purpuric spots was very much, if not altogether exclusively, confined to the algid cases; at least, I have not myself observed it in any of the other forms: it was unquestionably a symptom of very bad augury; but as they presented themselves in connection with phenomena not one of which almost admitted of any other prognosis, purpuric spots could not be said to have any special value in guiding us to an opinion as to the probable issue of a case.

Hæmorrhage from the nose.—Epistaxis was a very constant phenomenon, either occurring singly, or, as was more commonly the case, being associated with bloody exudation from other parts. The amount of blood varied much, being sometimes only a slight oozing or draining from the nasal membrane, in other cases coming away in quantities varying from a few drachms to some ounces. I have not seen any case of profuse and uncontrollable hæmorrhage from the nose, or one in which the bleeding from this quarter was in such quantity as of itself to threaten life. In smaller quantity, as a slight oozing, with the formation of bloody crusts on the alæ of the nose, it was a very general symptom in the class of cases in question.

Hæmorrhage from the gums.—This, likewise, was a very constant source of hæmorrhage, which, though never copious, was frequently continuous, and for this reason often the cause of a very considerable loss of blood. The hæmorrhage came, either from the interval left between the teeth and gums by the detachment of the latter, which frequently took place, or from the superficial surface of the gums. In the latter case, the gingival membrane presented a thickened, soft, and spongy condition, similar to that so well exemplified in scorbutus. The bleeding was observed to come in several instances from the gingival membrane, on the internal face of the dental arch, as well as from that on the external. This hæmorrhage from the gums was frequent in the other forms as well as in the algid, but I believe it to have been a constant phenomenon in this latter state.

The tongue was very generally smeared with blood; but I am not aware of any case in which the observation was actually made of hæmorrhage from the lingual substance itself. The same is to be said of the conditions of the buccal membrane, the velum palati and all other parts within the mouth. It was not uncommon to find these parts smeared with blood, but it could be generally tracted to the gums as the source from which it chiefly, if not exclusively, oozed.

The blood commonly smeared all parts within the mouth, including the tongue, more or less tinging the saliva also; it likewise crusted in the form of blackish sordes on the teeth and gums, and in dry black masses on the lips and about the angles of the mouth; and in the case of continuous oozing from the gums, it could be observed in some instances trickling from the corners of the mouth, and staining the lower parts of the patient's face, soiling and smearing his hands, the bedclothes, and all articles brought into contact with him; and thus adding much to the appalling and horrifying features of this class of case, already sufficiently dwelt upon.

Hæmorrhage from the lungs.—I have not witnessed a single instance in the algid form of hæmoptysis as an isolated symptom. Sputa variously tinged and mixed with blood were frequently brought up, but from what has been just said of the manner in which the oozing from the gums gave a bloody tinge to all parts and structures within the mouth, it will be understood that, in the absence of distinct pulmonary hæmorrhage, which I have not myself seen, it was difficult to determine whether the blood came from the lungs or not.

Judging from the analogy of the cases in the other forms of the disease in which bloody sputa were ejected, and in which no oozing of blood took place from the gums, it may be readily assumed as probable, that in the general hæmorrhagic tendency so well evidenced in most organs in the algid form, the bloody sputa were ejected from the lungs in this state in these varieties of the affection. Post-mortem results make the supposition still more probable.

Hæmorrhage from the stomach. — Hæmorrhage from the stomach in some form was a constant phenomenon in the algid state. It was most frequently presented as black vomit; but all varieties were observable, from that of a slight admixture of coffee-ground matter, to the rejection of large quantities of blackish red, but otherwise little altered blood. I have said that gastric hæmorrhage was a constant phenomenon; and this may be taken as a rule absolutely without exception in the algid cases, if we include the post-mortem results as well as the state before death. It sometimes happened that black vomit or other gastric hæmorrhage was not observed up to the last moment of life, but that in the removal of the body after death, or by the expedient of making pressure with the hand on the abdomen, or in several instances without other causes than those acting within the body itself (development of gases and consequent increase of pressure on all internal parts) copious streams of blackish fluid or semi-fluid blood, or matter corresponding to black vomit, issued in quantity from the nose and mouth. In other and rarer instances it was only on opening the cavity of the stomach that the hæmorrhage from this organ was detected. In all the algid cases, however, as far as my experience of them goes, gastric hæmorrhage was present in some shape or other, either before or after death, and if in the former instance, invariably in the latter likewise.

The period of occurrence of black vomit during life was very variable in this as well as in the other forms of the fever. It certainly observed no stated period in the algid cases, and seemed in no way necessarily to precede or follow the other hæmorrhagic phenomena. It was occasionally amongst the earliest symptoms, while sometimes it almost immediately preceded death; but even when profuse and continuous, it did not seem to have generally that immediately fatal influence often ascribed to it, and which, no doubt with justice, has caused it to be regarded as the precursor of death in other epidemics. When early, I have known it to be followed by an interval of comparative tranquillity, and a slight alleviation of the other symptoms. I have known it to occur for the first time as late as the 6th, 7th, or 8th day, and yet to precede death by one, two, or more days.

I have observed it in connexion both with pyrexial and completely apyrexial states. It has likewise occurred, and with apparently indifferent results as to amount and duration, in cases presenting marked gastric heat and pain, and "epigastric anxiety," and in other cases in which these symptoms were wanting altogether, or nearly so, and in which it appeared of an almost purely passive kind; it has been present as a symptom more or less continuous for days together, and it has occurred at one particular period of a case, after which it did not return; or it immediately preceded death, in which latter case it was often copious and profuse. With the exception of oozing from the gums, and the purpuric spots and patches so frequently present in the algid form, as already stated, black vomit was sometimes, but only in very rare instances, the chief example of hæmorrhage presented by these cases.

Hæmorrhage from the intestinal canal. — Blackish bloody dejections, sometimes in considerable quantity, occurred in the algid cases. This form of hæmorrhage was pretty often observed, but it was far from being a constant symptom, and was by no means so frequent as we would be led to suppose from the results of the examination of fatal cases, which, in a very large proportion of the algid cases, constituting certainly the great majority of them, exhibited post mortem more or less extensive effusions of blackened and otherwise altered blood throughout various parts, sometimes through the entire tract of the intestinal mucous surface. While these appearances were nearly constant in the intestines post mortem, we did not find that bloody dejections were very frequently present at any period of these cases during life, not even at that stage immediately preceding death. And while the escape of black vomit from the mouth and nose not infrequently occurred in the period shortly subsequent to death, both in those cases in which it was and in those in which it was not present as a symptom during life, I do not remember to have witnessed a single instance in which a similar escape of black or bloody matters occurred per anum after death. And yet, in some cases, the amount of intestinal hæmorrhage was enormous: thus we have found the whole tract of the alimentary canal, from the stomach to the anus, literally filled with black, discoloured, bloody matter, in some cases almost pure blackish blood. Indeed it would seem as if in some instances the last vital act was the sudden precipitation of the whole hæmorrhagic force upon the intestinal surface, and the evacuation in this direction of a quantity of blood which, regarded simply as a hæmorrhage, must have been in itself quite sufficient to produce immediate dissolution, from whatever part of the system it may have been poured forth. Such hæmorrhage as that now alluded to must in all instances have occurred at only the shortest intervals before death; and I have no doubt that in many cases death was actually caused in this way.

Hæmorrhage from the vagina.—This was a symptom pretty frequent in the algid form. A distinction requires to be made between those cases in which hæmorrhage per vaginam occurred at periods not connected with the menstrual function, and in which the bleeding seemed to be the result of the general hæmorrhagic tendency in the system, and those cases, on the other hand, in which females were attacked with the disease at or about the time of the regular menstrual period. There can be no question as to the occurrence of the former kind of hæmorrhage independently of the menstrual function, as it was known to take place at periods immediately succeeding the regular menstrual discharge. On the other hand, cases occurred in which it may be supposed that the regular period was accelerated or anticipated; and more or less extensive hæmorrhage per vaginam was the result, in some instances, at all events, as proved by post-mortem examination, having its seat in the uterine walls.

It may be here mentioned, that an impression has often prevailed that vaginal hæmorrhage has a salutary effect, and it has been supposed that its occurrence during the course of the fever improves the patient's chance of recovery. Certain it is that I have known recoveries attributed to the occurrence of this symptom by very intelligent persons. I cannot, however, say that what I have myself observed of such cases in any respect bears out the idea. I have met with several instances that would prove the contrary, if anything; and in the algid form it was in my experience anything but a favourable sign.

Secondary lesions of the algid form.—I have but rarely seen any instances of secondary lesions in connexion with the algid form. Parotitis, and the erythematous affections so frequently met with in the other varieties, were almost entirely wanting in the algid cases. The system did not seem to retain sufficient reactive power to be able to produce or develop them.

STHENIC FORM.

In marked contrast to the algid form are the cases to which we have given the name of Sthenic. This class of cases is neither so numerous nor in some respects so formidable as the variety just considered, nor again as that which we have denominated the Hæmorrhagic form. And this observation holds good with regard to most of the great epidemics of yellow fever of which we have reliable accounts. I have seen this class of cases in the young, as in boys and girls of from 6 to 10 or 15 years of age; but it was especially well marked in both sexes at the prime of life, and in persons with well-developed muscular frames.

Clinical history of the sthenic form.—The sthenic cases are in general characterised by well-marked febrile symptoms, severe and persistent headache, and much rachialgia at the outset, with subsequently a well-developed pyrexial state, high and full pulse, sometimes hard, and even occasionally thrilling and resisting, with flushed face and throbbing temples. The calor mordax is commonly everywhere perceptible, and the thermometer in the axilla indicates a considerable increase of temperature.

Temperature indicated by the thermometer in the sthenic form.—This class of cases generally exhibits from the outset a remarkable elevation of temperature. It is common to find an increase of 3°, 4°, or even 5° Fahr., and in some instances an increase of nearly 7° has been observed. We have noted the thermometer in the axilla at 102°, 103°, 104°, and in some instances it nearly touched 105° Fahr. This limit I have not actually seen reached in any case, though the mercury in some instances rose considerably above 104°. (The instrument employed, an English one of the kind commonly used for hospital purposes, did not admit of more minute or accurate readings than by whole degrees).

This form does not present any marked varieties, the cases having generally a pretty uniform course and very similar characters throughout. A very remarkable circumstance about some of these cases, which I observed in the Lisbon epidemic, was the very unexpected manner in which death took place. (Case 2, in Table II., p. 40, Parliamentary Report.)

The pyrexial state is in general early developed. I have seen a case on the second day with hot skin, congested face, eyes suffused, the tongue dry, furred, and brownish, the pulse 104°, and the thermometer in the axilla marking 103° Fahr.

This set of pyrexial phenomena often continues for days, sometimes for six, seven, or more days, when a remission, or what should be more properly termed an apyrexial interval, more or less well-marked,—that is, with a more or less complete cessation, or absence of febrile symptoms, supervenes. I have known all the characteristic phenomena of the fever, such as yellowness, black vomiting, and other forms of hæmorrhage, to occur within this stage or period, when after seven, eight, or ten days, without a recurrence of anything like well-marked pyrexia, the case had apparently begun to pass into slow but regular convalescence. In other instances a true pyrexial state, but commonly with less well-marked characters, was re-established; subsequent to which, as will be afterwards considered, even a third stage was presented in some cases.

State of the faculties in the sthenic form.—Smart delirium often accompanies these cases. This is to be expected when the head is hot, the face flushed, the temples throbbing, and other symptoms of increased vascular action in the cerebrum are observable. Some few cases only occur in which delirium ferox, wild excitement, restlessness, and efforts to get out of bed require physical restraint.

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Lighter cases, with only wandering and muttering delirium at night, are more frequent. Sometimes, but rarely, the congested eye, with the well-known "ferretty" expression, the contracted brow, continuous muttering and delirium, never-ceasing tossing of the head from side to side, with increased heat and much pulsation in the superficial vessels of the head and in the carotids, indicate that mischief has been going on within the cranial cavity. In such cases coma supervenes, the urine and fæces are passed involuntarily, and death results. Various lesions of the brain and its membranes in connection with this state will be found described in the section devoted to the consideration of the pathological anatomy of the disease. (See particularly the case of a soldier of the Municipal Guard, Parliamentary Report.)

Gastric symptoms. — Nausea, heat, pain, and anxiety in the epigastric region, are observable in many cases at an early period; they are generally, however, but subordinate symptoms in the case, and by no means of the same marked character as in the algid form.

State of the tongue. — Various conditions of this organ are observable. It is creamy, furred, or coated at the outset; dry, furred, and brownish in some few instances. As the case progresses it becomes more dry and brown, sometimes assuming a contracted and pointed figure; the shape, colour, and dryness then giving to it the peculiar and characteristic appearance known as "la langue perroquet," or parrot's tongue.

State of the surface.—We have already considered the biting heat and the marked increase of temperature shown from an early date in these cases. The yellow colouration is perhaps better marked in the class of cases now under consideration than in any of the others. In some instances it is of a light lemon tint, general over the whole surface; in others it is a pretty deep gamboge; in others again it is of a more dusky hue, and verging upon orange. As far as my experience goes I cannot record any observation to show that there is any one specific period more than another at which the discolouration more generally supervenes. It seems to me to observe no particular period. I have seen it as an early symptom on the third day, slightly developed, but fully recognisable both in the conjunctivæ and on the cutaneous surface generally. By the sixth day I have seen the skin intensely yellow in one set of cases, while in another it was only at this period that the yellow colouration began to appear slightly. I have seen a case up to the ninth day without the slightest yellowness. It has first presented itself during the continuance of the pyrexial state, and likewise at the apyrexial interval. It has appeared in connection with and during states of reaction, and likewise in states of sinking and depression. It has been found associated with quick pulse, hot skin, high thermoter, and with precisely opposite states. It has been absent when hæmorrhage was present in some form or other, in this and the other varieties of the disease (its absence was most frequently observed in the algid form, as already fully explained); but I am not aware that yellow discolouration was present in any case in which hæmorrhage of every kind was absent throughout from first to last. (Such cases, be it observed, were occasionally presented in hospital; but whether they were to be regarded as examples of the fever is, to say the least of it, very doubtful.)

Once well developed, the yellow colouration was very slow to disappear; and in most cases it continued without very sensible diminution during the patient's stay in hospital while convalescence was being established.

I have observed its occurrence in the conjunctivæ so early as the third day, with the pulse at 76, and but little heat of surface. In another case slight general yellowness was presented on the third day, the thermometer in the axilla marking 104° Fahrenheit, and the pulse being full, strong, and at the rate of 112 per minute. I have likewise observed it to occur on the fourth day, with the skin very hot, and the pulse 108, the tongue white and furred, and the patient delirious, but as yet presenting no form of hæmorrhage. It was in another case presented first on the fifth day; black vomit in small quantity, but quite characteristic, appearing about the same time. It was persistently absent in the remarkable case of a girl aged 13, admitted on the fifth day of her illness, with copious and characteristic black vomit ("*noir de café*") for two days, after which the symptoms gradually disappeared.

In general, then, it may be stated that the yellow discolouration is not necessarily associated with any particular stage of the disease, or with any special class of symptoms, *those only excepted which belong to the hæmorrhagic group.* It seems to occur indifferently in well-marked pyrexial and in apyrexial states, with all rates of pulse, and with all conditions of the animal temperature, from 2° below, to 7°

above the healthy standard. In the sthenic form, now under consideration, it is most commonly associated with an elevation of the thermometer, to the extent of 3, 4, 5, or more degrees.

Function of respiration. — I have but very little to observe with regard to this function, derangements of which are of rare occurrence, though, as proved by post-mortem examination, engorgements of the lungs are common enough; but, generally speaking, these conditions do not occur till very shortly before death.

Function of circulation.—Quickened pulse, with increase of its volume, and more or less hardness and thrill, are commonly observable in the pyrexial state, which, in numerous cases, is frankly developed and established early, and exhibits a pretty high and continuous tension for several days, 5, 6, 7, or more, as the case may be. The cardiac action is likewise augmented, and in a proportionate degree in various instances; the impulse being full and strong, and the sounds clear, full, and sometimes of a ringing character.

Rate of the pulse in the sthenic cases.—The pulse, though often full and expanded, and occasionally hard and thrilling in this form, commonly ranges but little above 100 or 110 beats per minute. I have noted it in some cases at 112, 114, and in very rare instances so high as 120. In general, when the pulse runs above 115, the case passes into a low and typhoid state; on the other hand, I have seen well-marked pyrexia with a pulse at 60. It has fallen to 100, 90, 80, and even 70, and in two instances to 60, without very well-marked diminution of the other pyrexial symptoms; in these latter instances it has always retained its force and expansion. Thus we not unfrequently have the combination of a pulse at 70, 80, or 90, or in general terms *under* 100, while the thermometer in the axilla shows a persistent temperature above 100° Fahrenheit.

The following combinations of pulse rate and temperature were observed in the course of my investigations into the Lisbon epidemic; they are selected to show the absence of harmony and the frequent contrast presented by the two sets of phenomena: —

TABLE OF PULSE RATE AND TEMPERATURE.

1.	In case with	pulse at	113 per minute,	full,	the thermometer in	axia	gave a temperature of 102°	Fahr.
2.	,,	,,	100	,,	,,	,,	100°	,,
3.	,,	,,	112	full	,,	,,	104°	,,
4.	,,	,,	104	,,	,,	,,	103°	,,
*5.	,,	,,	92	,,	,,	,,	101°	,,
*6.	,,	,,	100	,,	,,	,,	103½°	,,
*7.	,,	,,	104	,,	,,	,,	103°	,,
8.	,,	,,	100	,,	,,	,,	104½°†	,,
9.	,,	,,	84	,,	,,	,,	99°	,,
10.	,,	,,	70	,,	,,	,,	100½°‡	,,

From this table, already cited in a former chapter, it will be seen that the highest pulse rate and the highest temperature did not correspond. On the contrary, the highest pulse at 113 had only a moderate degree of elevation of the thermometer, 102°; while the pulse at 100 gave the highest temperature, and the lowest pulse rate, that at 70 beats per minute, was attended by calor mordax and an elevation of the thermometer to 100½°. There was, therefore, no constant uniformity of relation between the two sets of phenomena.

Hæmorrhages in the sthenic form.— Generally speaking, this class of cases is attended by hæmorrhages from one or more parts or organs. The hæmorrhages are, however, not so profuse as in the algid form, nor so numerous as in the next variety, which we have designated the Hæmorrhagic form *par excellence.*

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* These observations were made on the same case (one which passed into the hæmorrhagic form) at intervals of two days. Calor mordax was present throughout in a marked degree.

† Calor mordax very marked.

‡ Skin very hot.

Hæmorrhages from the eyes.—Bright pink colouration of the conjunctivæ, a symptom of very striking character, is occasionally observable. Minute vascular injection is a much more common symptom, and in some of the worst cases this is accompanied by a kind of hæmorrhagic weeping from one or both eyes.

Hæmorrhage from the nose, mouth, gums, &c.—These hæmorrhages are occasionally observable in the sthenic form, but not by any means so constantly as in either the algid or the hæmorrhagic varieties. Bleeding from the gums, in particular, is a far less common symptom in the sthenic than in the algid form, in which latter I believe the spongy and scorbutic state of the gingival membrane is, as I have already stated, all but constant.

Hæmorrhage from the lungs.—Hæmorrhagic sputa are not uncommon in this class of cases, and by reason of the frequent absence of the bleeding from the gums, the pulmonary hæmorrhage is more readily recognised as such than in perhaps any other form of the disease.

Hæmorrhage from the stomach.—Characteristic black vomit, both in the form of "noir de café," or coffee-grounds, and with the more distinct appearances of blood slightly altered, is observable in the sthenic cases. But I believe I am justified in saying that this is the class of cases which more frequently than any other presents a total absence of this symptom during the greater part, if not, as in some instances actually is the case, during the whole course of the disease. But, as in almost all the cases of this and the other forms of the fever which do not present black vomit during life, I do not know, from my own experience, of a single instance in which after death the stomach did not present more or less of hæmorrhagic effusion in some form.

Hæmorrhage from the bowels.—This, never a constant symptom during life in any of the forms of yellow fever which I have witnessed, is rare and exceptional in the sthenic cases. Hæmorrhages from the intestinal surface are observable post mortem, but far less commonly, and in general much less in quantity than in the other varieties.

I cannot speak of any other form of hæmorrhage in the sthenic cases but as of most rare and exceptional occurrence. There seems to be a complete absence of any tendency to cutaneous hæmorrhage, or the development of any form of purpuric spots or patches, in which particular these cases contrast in the most marked manner with those of the algid form. The sthenic cases, it may be said, present an entirely normal state of surface, setting apart, of course, the yellow discolouration.

It is in this class of cases, I believe, that recovery is most frequent, and that the therapeutic measures employed are really efficacious and attended with manifest benefit.

HÆMORRHAGIC FORM.

Next to the algid form, the cases to which we have given the designation of "*Hæmorrhagic*" *par excel-*

lence, are those which present the most characteristic, appalling, and impressive features of the disease.

Gastric phenomena.—Epigastric anxiety, with or without heat, and pain on pressure in the epigastrium, is frequently well marked in the hæmorrhagic cases. I have observed it in males, but more characteristically, I think, in females. In the latter it is often attended with sighing, sometimes weeping, nervous apprehension, and other symptoms to which we would, at other times, apply the term hysterical.

The great and leading feature of these cases, entitling them to separate consideration under this distinct head, is the tendency to profuse simultaneous effusions of blood from various parts and organs. It is true that we occasionally have hæmorrhages from the same parts, and even in extreme instances to the same extent in the other varieties of the disease; but in this great group of cases there is a remarkable tendency to the profuse and simultaneous issue of blood from almost all parts that can possibly be the seat of hæmorrhage. Thus this class of cases differs from the others in the frequency, the variety, and the combination of the sources of the hæmorrhages more than in the character or degree of any one of the bleedings which takes place. Black vomit, for instance, may be, and, unquestionably, often is, as profuse, as characteristic, as persistent, and in every respect as well-marked a symptom in the algid or the sthenic cases as in the hæmorrhagic. But in this latter form, when the hæmorrhagic tendency once declares itself, *hæmorrhage is never single, nor from any one source or organ only.* Black vomit is combined with profuse intestinal hæmorrhage, and with vaginal hæmorrhage in females, with bleeding from the nose, the mouth, and the gums, and hæmorrhagic sputa from the lungs, with bleedings from the eyes and eyelids, occasionally from the ears, and from several parts of the cutaneous surface denuded of epithelium by vesication or otherwise. Any accidental abrasure in fact gives rise to bleeding more or less profuse.

Such are the hæmorrhages presented during life, often simultaneously, and, as if having an origin in the one common vascular impulse, directed simultaneously upon all available points of the system from which blood can issue forth.

But the hæmorrhagic tendency is still further shown on post-mortem examination: — (1.) The cutaneous surface is surcharged with blood, as is evidenced by minute universal vascularity, and deep purplish-red hæmorrhagic staining of the face, cheeks, back of the neck, chest, abdomen, and extremities; universal turgescence and prominence of the superficial veins are likewise constantly observable. (2.) The brain, on its surface, in the ventricles, and throughout its substance, as well as in its membranes, gives evidence of the general vascular lesion. The base of the cranium and the ventricles contain bloody serum in greater or less quantity; blood appears on the lower sections also, and under the membranes. The sinuses and the cerebral vessels are gorged with blood. The rachidian venous system and the membranes of the spinal cord are occasionally extremely gorged with blood to the lowest point of the vertebral canal.

The stomach and the entire intestinal tract are often filled with slightly altered black blood; and, in a word, a universal sanguineous engorgement of all internal parts and organs exists in combination with more or less profuse parenchymatous and superficial hæmorrhagic effusions.

Clinical history of the hæmorrhagic form.—In some cases the disease presents the form now under consideration from a very early period after the development of the pyrexial state. In other instances the sthenic form is that first developed, and the cases subsequently assume the fully marked hæmorrhagic type. I have observed this in the hæmorrhagic form in both males and females; amongst the latter in a remarkable degree in those of extreme obesity. I have not observed it in the very old, nor, again, in the very young; and if the cases I have met with can be taken as a guide, it would seem to me to be in more or less direct connection with full and plethoric habits of body, and with the middle periods and most vigorous years of life. Most commonly this class of cases is fatal at an early period,—within five to seven days; more rarely the system resists the depression which results from the profuse hæmorrhages, and the cases then assume a low typhoid type of Continued fever, which sooner or later proves fatal. In one way or another (most usually as the immediate result of the hæmorrhages) the patients are lost in this form of the disease, and that without its being possible, by any therapeutic means which medicine affords us, to arrest their progress or modify their course in the smallest degree. Disease in one of its most appalling forms holds its sway throughout, and art stands helplessly by!

A very remarkable feature in this class of cases is the peculiar smell which emanates from the patient;

it is partially that of blood, but has another entirely peculiar character which I cannot describe, and can find no parallel for. In my experience it was always a fatal sign, even though appearing some days before death, and when the patient for the time seemed slightly improved in condition. I have observed this odour occasionally, but never quite characteristically, in the algid form, and even in the sthenie and purpuric cases in which any one variety of hæmorrhage was present to a profuse extent. But in no class of cases has it presented the same character of intensity as in the hæmorrhagic form.

Condition of the surface.—Yellowness of the conjunctivæ and the cutaneous surface generally is usually an early and pretty well marked phenomenon. I can verify the statement, that in this form the yellow colouration constantly appears during the primary pyrexial state and while it is at its height, with the pulse over 100, and the thermometer in the axilla registering 101°, 102°, 103°, or even 104°. It is, on the whole, not so vivid, nor, perhaps, generally so well marked as in the sthenic form, and in the later periods of the cases, and oftener after death, is not observed, and in parts is completely obliterated by the purplish red hæmorrhagic staining and the minute general vascularity and venous turgescence already spoken of.

State of the temperature.—The thermometer indicates generally a less considerable elevation of temperature in the hæmorrhagic than in the sthenic cases. I have observed the pulse at 92° and the thermometer at 101° Fahr. in a most characteristically well-marked hæmorrhagic case. The pulse subsequently rose to 100° and 104° in the same case, with elevations of the thermometer to 103½° and 103° respectively, calor mordax of the skin being present to a most marked extent. I do not, however, think that the temperature is generally so high in this class of cases. I believe that, as a general rule, the temperature in the hæmorrhagic cases is some 2° Fahr. under that in the sthenic form. The transition from the sthenic to the hæmorrhagic form is sometimes marked by a diminution in the rate and volume of the pulse, and a lowering of the thermometer; the patient's strength sinks visibly at the same time, and in some cases a clammy sweat bedews the face for one or two days. This state of things is followed by, as it were, an explosive and universal lesion in the vascular system, leading to profuse hæmorrhages at all available points of the cutaneous and mucous surfaces.

State of the faculties. — In respect to the state of the perceptive or sensitive faculties, the condition of the hæmorrhagic cases does not differ remarkably from that observable in the sthenic. When, however, the hæmorrhagic tendency is about to be developed, the patient sinks visibly, the face becomes congested, the eye suffused and vascular, and there is more or less indication of disturbed cerebral circulation, as evinced by heat, throbbing, and pain in the head, heaviness or drowsiness of the patient, a muttering delirium, and a semi-comatose state.

Complete absence of sensation with true coma I have but very rarely observed. In one marked case, the patient lay prostrate in bed in a low muttering delirious state, being occasionally violent, and requiring the restraint of a strait waistcoat to retain him in bed; he lay with his eyes closed, his mouth partially open, never sleeping, and with an unceasing rolling and tossing motion of the head from side to side on the pillow, which continued without intermission day and night for nearly forty-eight hours, when death put an end to the melancholy spectacle.

Though true coma is rare, as is indeed any profound cerebral lesion, various lesser affections, accompanied with muttering delirium, restlessness, and other effects of cerebral excitement, are sufficiently common in this form of the disease.

Function of respiration. — The clinical characters connected with the functions and organs of respiration present nothing of a positive kind, and hardly require special notice. Sanguineous engorgements of the lungs are commonly, indeed it may be said universally, found to be present in the post-mortem examination of these cases. Yet we have little or no distinct record of corresponding clinical symptoms: this is, I conceive, to be explained by the hæmorrhagic engorgement of the pulmonary structure taking place most frequently only at short intervals before death.

Hæmorrhagic sputa are commonly observable; but they become a very subordinate feature by contrast with the hæmorrhages from the other sources, which are so frequent and copious. In such a combination of hæmorrhagic effusions, as from the nose, from the gums and other parts of the mouth, and from the stomach, it would be exceedingly difficult, if not practicably impossible, in the great majority of instances, to establish the positive diagnosis of true pulmonic hæmoptysis.

Sputa with blood and mucus variously mixed, were constantly ejected; but I have not myself determined the occurrence of hæmoptysis to anything like a considerable or formidable extent in any one instance, and I am not aware that anything of a more positive character can be stated from the results of the inquiries and observations of other investigators.

Function of circulation. — This is the part of the system upon which, as it were, the whole force of the disease is precipitated in this class of cases.

State of the pulse.—I have nothing to record of a characteristic or peculiar kind in reference to the pulse. It is commonly less frequent than in the sthenic form, but has perhaps more of fulness and expansion, while its force is less.

I have carefully noted the condition of the pulse in numerous cases, and in no one instance have I met with anything approaching to the *dicrotous* character either before or during the height of the hæmorrhagic invasion; and that it was a very rare condition in the Lisbon epidemic is evidenced by the circumstance that in the large experience of Dr. May Figueira, one of the physicians to the Desterro Hospital, it was presented but once; this observer could call to mind only one single case in which the pulse presented a well-marked dicrotous beat.

The rate of the pulse is variable; it is commonly over, rather than under, 100 per minute. It is most generally full, soft, and expansive, and wanting in force and rebound. These, it will be observed, are not very positive characters; but no such were presented in the great majority of cases observed by me.

The pyrexial state is evidenced more decidedly by the state of the thermometer, which is usually over 100° Fahr. There is much variety in this respect; but what is important, and what can be positively stated, is that the hæmorrhages occur during the pyrexial period, and with elevation of the pulse, and the thermometer above the standard. Thus we have seen them presented with characteristic force and intensity, while the pulse was at 100, and the thermometer in the axilla stood at 103½°; but this latter is unquestionably an exceptional elevation for the form of the disease now under consideration.

Hæmorrhages.—We have already given a summary of the various forms of hæmorrhage met with in combination in this form; and it will not be necessary to go into any considerable detail upon the subject in this place. The remarkable character of this general hæmorrhagic lesion consists in the amount, the variety, and the combination of the several kinds of bleeding which take place.

We have observed in combination in a single case,—

1. Hæmorrhage from the eyelid (from accidental abrasure, but in unusual quantity.
2. Hæmorrhage from the nose.
3. „ „ gums.
4. Black bloody crusts on the tongue.
5. Hæmorrhage from the stomach, black vomit.
6. „ „ the intestines.
7. „ „ blistered surfaces.
8. „ „ the vagina was superadded in some cases in females.

Hæmorrhagic weeping from the conjunctivæ has been observed; I have myself seen but slight oozing of blood from the ears (and always in connexion with parotitis, to be subsequently spoken of), but distinct hæmorrhage in this quarter has been met with. Hæmorrhage from the penis has likewise been known to occur; but I have not witnessed well-marked examples of this variety of hæmorrhage; at least, not in sufficiently large quantity to be specially noticed as such. Mixed with the urine in variable quantity blood has been by no means infrequently observed, giving the smoky, or the distinctly blood-coloured tints to that fluid.

I have witnessed hæmorrhage to some inconsiderable extent from the internal surface of an abscess on the abdominal walls, from which the contained purulent matter had been evacuated.

Hæmorrhages from the nose and gums are frequent, and, with respect to the latter, are often in considerable quantity. I believe that I have likewise witnessed hæmorrhages distinctly beneath the tongue, but it was in most instances next to impossible to decide whether the bleeding came directly from this organ, owing to the continuous escape of blood from the gingival membrane, which stained and coated every part within the mouth. The tongue is bathed in bloody saliva, is blood-red at the tip and edges, and perhaps, also, crusted with blackened blood on the dorsal aspect. With the yellow colouration of the conjunctivæ and surface; generally congested if not sanguineous eyes; black blood-crusts on the lids or other parts accidentally abrased; the nose and angles of the mouth and the teeth and the borders of the lips crusted with blood, if not still dribbled and stained with freshly flowing blood; the tremulous tongue, when protruded, blood-red at the tips and sides, and thinly covered with blackish blood crusts on its dorsum; a combination of symptoms is presented, of as striking a character as can well be found in all the long category of disease.

Black vomit.—This symptom, or as I should prefer to designate it in this class of cases *Hœmatemesis*, is very constantly present, quite invariably so, if we include the condition of things found post mortem.

The *noir de café*, or coffee-ground vomiting, is commonly superseded in this form by a true hæmorrhage from the stomach; black blood in quantity being ejected from the mouth during life, and found post mortem in the stomach, and often throughout the whole intestinal canal.

Black dejections are not so generally present during life as might be supposed from the state of the intestinal surface found post mortem. I have already remarked on this in connexion with cases of the sthenic form, in which the presence of black matter in the intestines after death was not always preceded by black dejections during life. The connexion of these two appearances is more common in the hæmorrhagic form; but is yet far from being constant. On the whole, black dejections are in this, as in the other forms, far less frequent than black vomit, or, indeed, than any other variety of hæmorrhage.

We have already remarked upon the constantly fatal character of this form of the fever. The universality of the vascular lesion and the profuseness of the hæmorrhage at once explain this result, and likewise make evident the almost utter futility of all therapeutic means in dealing with so profound and extensive an affection.

Death seems to take place in many instances directly as the result of the hæmorrhages, and generally within a short period—twenty-four to thirty-six hours after they have set in. Some few remarkable cases, endowed apparently with a singular tenacity of life, resist for a longer period. Two or three cases only fell within my experience which lived quite through the hæmorrhagic period. These cases assumed a low typhoid form of Continued fever, with great prostration of strength, quick feeble pulse, and calor mordax of skin; the thermometer was up to 103° Fahr. for days in one remarkable case, with corresponding biting heat in the skin. They all died within a week or ten days from the cessation of the hæmorrhages and the first appearance of the typhoid symptoms. Hiccup becomes a very distressing and uncontrollable symptom in some of these cases, adding much to the patient's sufferings.

PURPURIC FORM.

By this term I propose to designate certain cases which, though not frequent in any epidemic, are of remarkable interest in some points of view.

I have already pointed out, in speaking of the algid form, the constant and indeed invariable occurrence, in that class of cases, of innumerable purpuric spots and small purpuric patches on all parts of the surface. In truth, the algid form was in itself a true purpuric disease; but the *algid* phenomena predominated, and hence are entitled to be considered as distinguishing that variety of the fever.

The cases I have denominated purpuric, do not however belong in any respect to the algid form: the pyrexial state is well marked, the pulse frequent, and the skin hot, the tongue dry, brown and furred or fissured, while the conjunctivæ and the general surface are intensely yellow.

The following is a brief and concise statement of the chief features of the most remarkable of the purpuric cases which came under my observation. The patient, a man aged 40 to 45, had presented the usual history and symptoms; on the eleventh day bleeding from the gums still continued, the skin was hot and everywhere yellow, as were likewise the conjunctivæ; the day following a large purpuric patch, four to six inches square, was observed in the left axilla, spreading to the front of the chest, which further presented several smaller patches of similar colour, extending to and a little beyond the mesian line. Slight but manifest œdema of the whole anterior part of the chest was observable. The skin was hot, the pulse only 70, but full.

Two or three days subsequently a similar but much larger patch appeared in the right axilla, which eventually occupied the whole lateral aspect of the right side of the chest, and extended to within a short distance of the crest of the right ileum; it likewise encroached upon the back. The colour of the patches varied from a reddish to a bluish purple; the borders were gradually shaded off in successive tints, till the ordinary yellow surface was reached on either side of the patch. The pulse had fallen to 52, the tongue was moist, but the skin still remained hotter than natural.* The patient was still very yellow. Ascites subsequently appeared: the case lingered out for more than ten days after the first observation of the purpuric spots, and ultimately died.

The patches observed in this remarkable case were precisely similar to those so often seen in the epidemic purpura hæmorrhagica of Ireland. Putting apart the yellow colouration—and if we bear in mind the presence of bleeding from the gums, and the spongy state of the gingival membrane—in both diseases the parallel was very close indeed.

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* I have unaccountably mislaid the notes of the thermometric observations, frequently taken during the course of this very interesting case, but my recollection is distinct of the fact that the temperature was throughout above the healthy standard.

This class of cases is of great interest in connexion with the question of the cause of the colouration in yellow fever. The purpuric patches are manifestly caused by subcutaneous effusions of the colouring matter of the blood; and all varieties and shades of colour and tints are observable, from bluish purple to yellow at the circumference of the patches, where the morbid tint passes into that of the surrounding skin.

TYPHOUS FORM.

I have given special attention to the study of the several clinical forms in which yellow fever presents itself, from a conviction that much of the discrepancy and apparent conflict of medical authorities in their descriptions of visitations of the same epidemic disease, at various times and places, has arisen from want of due discrimination of its leading characteristics and salient features.

The clinical phenomena which characterise disease, whether endemic or epidemic, seldom observe a constant and invariable relation to each other. And hence it is, that while in a given epidemic, in a given locality, at a given time, one set of phenomena will be prominent, if time, place, or other circumstances be changed, the disease will present in salient relief another train of symptoms, with perhaps a totally different clinical *cachet*, displaying another order of phenomena, and being wanting in those which were described as all but essential to it in its former phase.

To the investigators of typhous epidemics the force of these observations will be at once apparent. And if their bearing on the study of yellow fever epidemics be not equally apparent, it is perhaps because that of the numerous inquirers into the clinical history of this malady, so few have had an opportunity of witnessing its invasions under varieties of place, time, and other circumstances.

The observer and historian of an epidemic of yellow fever, in which the typhous form was predominant, would hardly recognise as an accurate portraiture of the disease the description of a visitation in which the algid was the prevailing type. Nor, again, would this latter form be familiar to one who had studied the disease as a sthenic fever.

The prevailing types in the Lisbon epidemic of 1857, were unquestionably those I have described as the algid, sthenic, and hæmorrhagic. Some few cases presenting a typhous character were, it is true, occasionally observed; but in no way would this fever admit of being reduced to the type of the typhus icterodes of authors.

Typhous characters.—Typhous phenomena were presented in two orders of combination in the cases observed by me. In one they appeared as the primary and essential characteristics of a case from an early period of the febrile invasion. Stupor and nervous depression, with the peculiar sunken expression of the face, the suffused eye, the flaccid state of the limbs, dorsal decubitus, feeble muttering delirium, and the other well-marked typhous characteristics, all became superadded to the hæmorrhagic phenomena, and the yellow colouration of the skin and conjunctivæ, which gave the special *cachet* to the disease. A case with these characters might be readily likened in external appearances, and indeed strikingly so, to the forms of typhoid pneumonia with jaundice, familiar to the Irish practitioner.

I must, however, here remark that in my experience of the late Lisbon epidemic, cases corresponding to the foregoing description were of extreme rarity. They were, in fact, so few as to form no practically important part of the epidemic.

The second order of association in which typhous characters were observed was, that in which cases having passed through the various stages of the sthenic or the hæmorrhagic forms, glided insensibly into a typhous condition on the cessation of the hæmorrhagic tendency. In these cases, the hæmorrhagic diathesis gave way to, or became supplanted, as it were, by the typhous type of disease. In no instance have I observed cases of the algid form to undergo this transition; this is intelligible from what has been already stated respecting the constantly fatal character of the cases under this head, which did not live to a period in which a typhous stage would have been possible.

The typhous condition, when developed as a secondary stage, presented the usual characteristic phenomena, with stupor and nervous depression. The pyrexial state was continuous, the pulse very quick but feeble, and the thermometer indicated an increase of temperature to the extent of four or five degrees. These cases proved fatal in all the instances which I had an opportunity of observing. Careful examinations were made post mortem, more especially through the intestinal tract; but invariably with the result of showing a complete absence of follicular lesion in any portion of the mucous membrane.

CONDITIONS COMMON TO ALL THE FORMS OF YELLOW FEVER.

Several phenomena may be considered to be common to all the forms of yellow fever.

A remarkable condition, which was specially noticed in the Lisbon epidemic, is that of a costive habit of body, which, it is to be observed, was by no means confined to those attacked by the fever. Indeed, the lamentably negligent and unclean habits of the population in several thickly inhabited districts of that city, furnished abundant ocular demonstration of the general prevalence of the condition alluded to. Thus, in numerous main and lateral streets and passages of the quarters Alfama, Mouraria, and Bairro Alto, the human dejecta with which the pavement was thickly strewn furnished to the passer-by, at every step, unceasing opportunities for koprological studies, to which his attention became thus forcibly and unavoidably drawn. From observations thus made through no inconsiderable extent of the most densely inhabited parts of the city, the conclusion is of necessity drawn, that a costive state of the bowels is, if not a universal, at least a very general characteristic of the Lisbon population. It will not be unfamiliar to medical observers, especially to those acquainted with the camp life of different nations, that marked characteristics may be recognised in the koprological phenomena of different peoples, dependent on the nature of the food used by them, the modes of using it, and the manner of cooking it.

Pretty extensive inquiry amongst medical practitioners, combined with personal observation, confirms the above conclusion. In relation to the causation of the epidemic, this condition, which is not a temporary one, can only be considered as amongst the collateral adjuvant causes, and not as one of any special import. It cannot be doubted, however, that in many instances, a more than usually confined state of the bowels was known to precede the invasion of the disease. By some this state was regarded as an undoubted predisposing cause of yellow fever; while the opposite condition, or that of a relaxed habit of body, and even the presence of a slight amount of diarrhœa, was looked on as a salutary condition, if not as a preventive.

As an indication for treatment, this condition was so far recognised as a guide, that active purgation was, in a great number of cases, largely employed at the outset of the disease. I cannot, however, say that there is any reason, based on reliable evidence, for assigning to this mode of treatment any superiority over rival plans, equally largely in vogue with other practitioners. I am not aware that this condition has been noticed in connexion with other epidemics of yellow fever.

Renal function.—The various conditions of the renal secretions may be summed up as follows:—Almost complete suppression of urine is observed in certain cases. In other instances, and this not unfrequently, the urine has been abundant, normal in specific gravity and reaction; high coloured or normal in this respect, often clear and transparent, and often of a rich straw or amber colour: while at other times it is found highly loaded with lithates, and presenting the brick-dust sediment, with more or less colouring matter in different cases. Under other conditions, the urine is found coagulable by heat and nitric acid, and it is occasionally brownish red, smoke-coloured, or variously tinged, from more or less admixture of blood elements.

I have not observed the specific gravity of the urine in any case to fall below 1011, or to pass much above 1030; in other cases, but certainly not with constancy, nor, in my experience, in any very large proportion of the cases, the peculiar reactions of the biliary colouring matters were detected.

No deficiency of any of the normal constituents of the urine has been observed by me in any single instance (putting apart, of course, those cases in which there was a total or partial suppression of this secretion). Urea has been detected in abundance by the usual reaction with nitric acid in numerous cases. Numerous small cylinders of fibrine, with casts of tubules and detached epithelial cells, have been not unfrequently detected by microscopic examination.

The various and apparently opposite conditions of the urinary secretion just enumerated may, I think, be, generally speaking, referred to definite conditions and to different forms and stages of the febrile disease, with which, as it appears to me, they were associated not without a certain uniformity, nor without a relation by no means unintelligible to the physiological pathologist.

Suppression of urine.—Partial or complete suppression of urine has not fallen under my observation except in connexion with the algid condition, whether we regard it as a form or as a stage of the disease. In cases presenting the well-marked characteristics of the algid state more or less complete suppression of urine was usually observable on the patient's admission into hospital, and while life lasted. In fatal cases it was very common to find a small quantity of straw or amber-coloured urine in the bladder. If reaction to any extent became established after the patient's admission to hospital, urine was again secreted in variable quantity, and was passed usually voluntarily, occasionally involuntarily; and, in a few instances, the introduction of the catheter was required for its removal.

Partial or complete suppression of urine in such cases seemed to stand in very intelligible relation with the generally depressed condition of the vital powers, and the stagnation of the circulation more especially, and was only one of several similar states of suspended action in the system. In a few instances albumen was found in the urine in connexion with this depressed condition of the circulation. Thus in one instance, with the thermometer at 96°, the pulse was observed to be 108, and two ounces of urine, specific gravity 1029, when coagulated by heat, were found to contain 39 grains of albumen. This, however, was one of the *semi*-algid cases, in which reaction subsequently took place, for in two days afterwards the pulse rose to 140, and the thermometer in the axilla gave a pyrexial temperature of 102° Fahrenheit, while two ounces of urine, with a specific gravity of 1016, gave now but 19 grains of albumen.

On referring to the results of the post-mortem examinations in yellow fever cases, it will be found that congestion of the kidneys, in common with most other internal organs, was sufficiently often observed. Albuminuria under these circumstances must be regarded as only of the passive kind, and the result of a forced elimination through the urinary tubules by the *vis a tergo* of congestion in the parenchyma of the organs.

Urine with excreta in excess. — This class of phenomena, according to the results of my observations, stood in direct connexion with the development of the pyrexial state. Urine, with high specific gravity, 1025—30, and intensely acid reaction, straw, fawn-coloured, or brownish-red, and with more or less abundant deposit of variously coloured lithates, constantly attended the well-marked pyrexia of the sthenic cases. It was likewise observed, but not so commonly, in connexion with the hæmorrhagic form.

The relation of these phenomena to increased tissue-metamorphosis with calor mordax of skin, quick pulse, and elevated thermometer was quite as marked, and as readily observable in the pyrexia of the yellow fever as in that of other febrile states, and manifestly depended on the same causes. Increased tissue-metamorphosis was progressing in the system, and its outward manifestations, constituting the elements of a true pyrexial state, were easily cognisable on search. This, it appears to me, is beyond question the true pathological connexion or relation of these phenomena.

Albuminous excretion by kidneys.—Albumen was found in the urine in the following orders of association:—

(*a.*) As the only abnormal element, and with or without other blood elements;

(*b.*) In company with abundant deposits of lithates, with or without co-existing deposits of purpurine or other colouring matter in excess;

(*c.*) In connexion with biliary colouring matter, the presence of which was shown by the usual reagents.

(*d.*) In connexion with pyrexial states; and

(*e.*) In connexion with apyrexial states.

The quantity of albumen was sometimes very considerable, as much as twenty grains to the ounce of urine in some instances. In some cases it was a persistent condition for many days; in others the quantity of albumen decreased rapidly, and finally disappeared. In one instance, the quantity fell in three days from about twenty grains to the ounce to about half a grain. Its relation to, and connexion with, a highly congested state of the kidneys was very obvious; I am, therefore, disposed to regard it as a manifest result of the passive congestion of the organs so constantly found in our post-mortem examinations; if viewed as such, it loses any special significance in relation to the peculiar type of febrile action, of which it was, in fact, an accidental and not a necessary concomitant, though it may be said not an infrequent one. It certainly had no relation to any condition of degeneration of the parenchyma of the organ, for none such was, as a rule almost absolute, ever found to be present; and it was usually associated with a high specific gravity of the urine, indicating and dependent on the continued excretion of the normal elements in at least a normal amount.

Excretion of colouring matter having the usual biliary reaction. — This is one of the most remarkable of the phenomena presented in the urinary secretions. It was neither a constant nor a very general condition; but yet it has been sufficiently often observed. It was found in connexion both with pyrexial and with apyrexial states, with and without deposits of lithates and colouring matter, and with or without albuminous excretions, as already noticed. The nitric acid test was that most commonly employed. It gave the usual appearance of iridescence, with finally the production of the dark olive green tint. With other reagents corresponding results were obtained.

Parotitis. — This affection has been noticed in several epidemics of yellow fever; it was amongst the most constant of the affections presented during the course of the yellow fever cases in the Lisbon epidemic; it was presented in some instances singly in one parotid region; in others it attacked both sides. The amount of inflammatory action varied a good deal; in many instances it was limited in extent; the heat, redness, pain, and swelling were moderate in amount, and caused the patient but little suffering: in other cases, on the contrary, a very violent inflammation attacked one or both parotid regions, which became enormously swollen, reaching occasionally the size of a large fist on either aspect of the face, rendering it impossible for the patient to open his mouth for days, and ending in profuse and exhausting suppuration, or leading to the suffocation of the unfortunate patient from the pressure of the inflamed mass on the parts within the fauces.

Leeching, with cooling applications, poultices, and the lancet, or the spontaneous opening of the swelling, gave various relief in different cases. In some instances a bloody sanious matter was evacuated; in others, the parotidean swelling was the seat of no inconsiderable hæmorrhagic oozing. It not unfrequently happened in these cases that the external auditory meatus was the source from which blood escaped; and I may here remark that I have not myself witnessed any other form of hæmorrhage from the ears, though I do not by any means desire to express a doubt of the possibility of such a hæmorrhage independent of parotitis, instances of which have been reported to me. Such an occurrence is so far probable that it is fully paralleled by the hæmorrhages from the eyes and other quarters not commonly the seat of exudation of blood.

With the exception of the inflammatory processes developed in the cutaneous surface of the extremities as the result of excessive vesicative action, and sometimes leading to gangrenous destruction of the superficial parts, as elsewhere noticed, I have no other instances of secondary inflammatory action to record in yellow fever cases.

An efflorescent rash has been described by some observers as making its appearance on the chest, and gradually extending over the abdomen and arms. On fine, delicate skins, rose-coloured spots have been remarked; but most of these appearances seem due to such causes as mosquito bites, which eventually become hæmorrhagic points; these must not be confounded with the purpuric spots and patches already described in connexion with the algid form.

Bloody furuncles have been found to occur in some epidemics, and seem to be regarded as sequelæ of the disease. They are found upon the wrists, over the metacarpal bones, along the front of the legs, below the scapulæ and over the hips, in the parotid region, and on the forehead and lips. They are said to occur in close proximity to the smaller arterial trunks; they become tender and acuminated, and, if opened, discharge a curdy and watery sanies. These furunculi occasionally communicate with a deeper inflammation, leading to abscess with subsequently infiltration of pus and blood, and occasionally gangrene of the parts engaged. Dr. Blair speaks of the possibility of the occurrence of similar furuncular action in internal organs; but, except in the kidney, he does not appear to have actually met with any analogous state. I have not observed any such conditions in my numerous examinations.

TREATMENT.

The treatment of the several forms of yellow fever resolves itself into the use of stimulants, counter-irritants, purgatives, including croton oil, and the employment of special remedies, such as quinine, bark, iron, &c. Blisters to the nucha, epigastrium, insides of the thighs, calves of the legs, and dorsum of the feet have been constantly employed. Blisters to the nucha are of use in relieving the headache and other symptoms referrible to the head. Vesication of the epigastric region frequently produces marked relief of the epigastric pain, and of the symptoms before mentioned under the term "epigastric anxiety." Blistering to the thighs and calves of the legs is employed as a means of stimulation in cases with much collapse and sinking. The application of mustard poultices is a popular remedy much in use, and as the reaction is low, the effect of their application is not felt at the time; they are thus often allowed to remain on for protracted periods, with the effect of inducing very severe and extensive vesication in the parts after reaction has taken place.

I have seen a condition approaching to gangrene, occupying an extensive surface of the anterior and posterior aspects of both legs in such cases, and likewise of the dorsum of the feet in others, as the result of incautiously protracted vesications. The amount of suffering thus inflicted on patients is often most severe and shocking.

Frictions to the chest, abdomen, and legs with various medicinal substances were in common use in the Lisbon epidemic; the tincture and decoction of bark were frequently thus used. Frictions with camphorated spirit were also much employed. Amongst the stimulants most constantly in use were wine, brandy, ammonia, and ether, all liberally exhibited as the urgency of the case required. A wine of strong body, and with a considerable per-centage of alcohol, was much employed in hospital practice; it was that known as "Lavradio." It was of the colour of deep-bodied port, but combined with the port flavour somewhat of that of the claret grape; it was a sound, strong-bodied, full-flavoured, and rich wine. I have seen it exhibited to the extent of twelve ounces per diem. In many cases I would have myself employed wine, brandy, and other stimulants with still greater freedom, but the general opinion was rather against unlimited stimulation; and it was likewise said to have been shown by experience to be ineffectual when the more moderate use of such measures failed to produce reaction. I am not indisposed to regard this opinion as well founded.

Use of bark, quinine, &c. — Decoctions of bark were constantly in use, with or without ammonia or other stimulants.

Quinine has been much employed; it is used both by the mouth and anus. Given by the mouth it may be prescribed in large doses, and in small doses it is used at the outset of the disease, and in all stages up to the last. In the form of enema I have seen it administered to the extent of seventy-two grains, divided into four clysters, one of which was given every sixth hour.

From my experience of this medicine, as administered in the epidemic we are now speaking of, I am far from being disposed to regard it as a drug upon which any reliance can be placed when exhibited during the course of the disease. The indications for its use as an antiperiodic are not very clearly manifested, and its tonic action is too slow in a class of cases in which prompt support to the system and immediate stimulation are often so urgently called for. But, as well observed by Dr. Aitken, "Testimony of the most undoubted kind has been adduced of the prophylactic influence of *bark* or *quinine* during service in unhealthy countries; and nowhere more unequivocally than on the West Coast of Africa, by Drs. Bryson and Baillie." As a prophylactic, quinine may be administered in from three to ten grain doses once or twice daily. Wine constitutes a good vehicle for its exhibition; and its use should be continued for two or three weeks, according to circumstances.

The perchloride of iron is employed as an internal remedy in doses of from three to six grains, two, three, four, or more times in the day, and in some cases at least with apparently good results in arresting the hæmorrhagic tendency. Chromic acid, in doses of from three to six grains, may also be used internally with the same view; but, in my opinion, it has not proved so effective a remedy as the perchloride of iron.

An abortive plan of treatment is much in vogue with some practitioners, the object being to cut short the disease if possible. With this intent twenty grains of calomel are administered at once, with twenty-four grains of quinine. This is followed by two drachms of carbonate of magnesia with two ounces of sulphate of magnesia, in eight ounces of peppermint water. (Dr. Blair.) These doses are repeated at intervals of from four to six hours: one dose is said generally to be sufficient; but four doses have been administered before the desired result was produced, and without the induction of cinchonism. "When a state of apyrexia is induced, the end is attained; but if the urine has become coagulable, or the epithelium of the tongue has begun to be shed, it is of no use pushing the 'aborting doses' further." (Aitken, Blair.) I have myself no experience of this plan of treatment; but I consider it as one not free from danger, unless in cautious hands. Dr. Copland and others speak highly of the use of turpentine in drachm doses by the mouth, or half-ounce doses in the form of injection per anum. From the well-known styptic properties of this drug its use is rationally indicated, and it comes under the same category as perchloride of iron.

Dr. Blair recommends the use of powdered gum arabic (three drachms to six ounces of cold water, in table-spoon doses every two hours, or oftener) when the epithelium of the tongue is abraded. Cold affusion is spoken of by Bancroft, with a view to alleviate the sense of burning heat so often urgently complained of. Iced drinks may be given with a like intent. The wet sheet is lauded by others, and as a means of supplying moisture to the system when the stomach has ceased to be an absorbing viscus. Some authors seem to recognise a supplementary action in the skin, by which it absorbs water, and thus aids in reducing the crasis of the blood.

Morphine, creosote, and hydrocyanic acid may be used to allay the nervous excitement and the irritation of the stomach. The first of these drugs must be given with caution, as yellow fever seems to exercise some predisposition on the system whereby it is rendered more sensitive to narcotics. When the urine is not albuminous morphia is said to be better borne. Dr. Blair considers one-fourth of a grain of the acetate of morphia a maximum dose in the twenty-four hours for an adult.

Mild and bland food must be carefully administered to support the patient's strength, and stimulants with a liberal but judicious hand. Effervescing wines are often grateful and refreshing to the patient.

The following valuable conclusions are given by Dr. J. R. Martin:—"The most speedy means of prevention, in respect to towns and garrisons, will always be found in the removal of both the sick and the healthy to a locality where the temperature is sufficiently low, such as a neighbouring elevated range, or dry well-ventilated ground; the next most ready means is segregation.

"Whenever fever makes its appearance on board ship, she should at once proceed to sea, and into the coolest atmosphere within reach.

"The most immediate measures of prevention should be to obviate direct solar exposure, to prevent fatigue, and excesses in the use of spirituous and fermented liquors.

"Seamen should be kept as remote from unhealthy coasts as is consistent with duty, anchoring some miles out to sea, during the night especially.

"Duty in boats should be conducted during the mornings and evenings, avoiding alike the noon-day heats and the deadly emanations from the shores common to the night. When men are landed, a carefully selected encampment should be chosen on high and dry ground.

"Meals should be regularly served and carefully cooked, and no more spirit ration should be issued than is customary. Coffee should be given early in the morning as a habit, and after unusual fatigue, cold, wet, or mental depression; and labour ought not to commence until coffee has been taken.

"Holds of ships should not be cleansed on the spot where the fever has originated, or during its prevalence, but should be deferred till the arrival of the vessel in a cold latitude.

" Green wood should not be placed on board ship in hot climates ; it ought to be ' barked ' and partly charred."

With respect to quarantine regulations, this is hardly the place to enter on the subject; but I may briefly state my own conviction that, as ordinarily carried out, they are of little or no effect in preventing the spread of the disease.

CHAP. X.

(SUPPLEMENTARY.)

PATHOLOGICAL ANATOMY OF THE YELLOW FEVER OF LISBON (1857).

I SHALL here consider in anatomical order the various lesions observed in fatal cases of yellow fever during the epidemic at Lisbon. It may be useful to give them *in extenso*, in this place, as full records of the pathological anatomy of the disease are not readily available.

EXTERNAL APPEARANCES.

Generally speaking, the body was well nourished, the muscular structures were well developed, and there was commonly more or less abundant deposit of adipose tissue, which gave full and rounded proportions to the trunk and extremities. Instances of remarkable obesity were by no means uncommon, more especially in females, in whom it was sometimes extreme. I think the case No. 12, Table II. p. 53, Parliamentary Report, was the most exaggerated example of superficial, interstitial, and internal adipose accumulation that I have ever examined. The masses of fat deposited between the layers of abdominal muscles, for instance, and in the mesentery, and on the posterior wall of the abdomen were several inches (2 or 3 inches) in thickness, and far surpassed anything of a similar kind I have ever witnessed.

Examples of an opposite condition, or that of emaciation, wasting, and ill-nourished frame, were very rare indeed, and I can call to mind but a very few instances of anything like considerable wasting of the tissues.

It is to be remembered that the mean age of those attacked with yellow fever was about 33 for both males and females. This represents the prime of life, of vigour, and of physical development of the various organs, parts, and tissues. It was therefore with the bodies of persons struck down in the prime of life, and by a disease that causes no wasting or emaciation, for its course is too rapid, that we had to deal in the post-mortem room.

Other corroborative observations are not wanting, to warrant the statement that the Portuguese race is well developed and well nourished.

Rigor mortis was well developed and persistent in the great majority of cases. The muscular masses were thrown prominently into relief on various parts of the trunk and extremities. The trapezius, deltoid, pectorals, biceps, and the flexors and extensors of the forearm and hand were thrown up in rigid elevations. The hands were in the majority of instances firmly closed.

The recti, vasti, and gastrocnemii in the lower extremities were boldly defined, and could be traced through a large part of their extent and attachments. The numerous muscular markings about the knee were well defined. The contraction of the muscles was persistent and uniform. Cadaveric movements have not been observed to occur as far as I am aware. I have not myself witnessed, nor have I heard mention, of any such movements. Irritability of the muscular fibres usually remained at the period of post-mortem examination (average 10 to 12 hours p.m.) to a considerable extent. A cross section made into the recti or vasti muscles in the thigh was followed by retraction of the opposed surfaces to the extent of 1 or 2 inches. Similar retractions were observable in sections of almost all the other muscles.

The feet were contracted and turned in: the heel was raised by the tendo Achillis: the dorsum of the foot was arched by the plantar muscles, while the outer edge inclined inwards, and the plantar surfaces looked towards each other.

The post-mortem examinations were made in the spacious, cool, and well-ventilated "Salle des Dissections" of the Medico-Chirurgical School of Lisbon, attached to the great hospital of St. José. The temperature of this room was seldom above 50° to 55° Fahrenheit. The examinations were made at various intervals after death; sometimes after the lapse of only a few hours (3 to 4 hours); at other times 12 to 16 hours had elapsed. An average of 10 hours may be stated as the time after death at which the most of my investigations were made.

There was nothing in the conditions to which the bodies were exposed after death, and before post-mortem examination, to promote an unusually early decomposition, and except in the instances to be subsequently specified, no instance of remarkably advanced decomposition was observed.

Generally speaking, the cooling of the surfaces and of the internal parts took place gradually, and without any remarkable difference from the ordinary process of lowering of the temperature of dead bodies. I have seen no instance of elevation of temperature post mortem, in the algid cases, nor am I aware that any such elevation has been determined. It is quite possible, however; and in such cases as those already cited, with the thermometer in the axilla at 96° Fahrenheit during life, and probably far lower in the extremities, which were sensibly cold to the touch, it is even likely that for a short period after death some increase of temperature would have been observed. I shall presently allude to some remarkable cases of continued warmth of the body for 16 hours and upwards after death.

General Appearance and Coloration of the Surface.— The yellow fever cases assumed a peculiar *cachet*, and a special physiognomy of a very marked character, which once seized is never forgotten, though like many other striking phenomena, by no means readily admitting of absence of yellow coloration during life. In some instances the yellowness was slightly apparent a few hours before death; in others, and the great majority of instances, it was not evident while life continued, but soon after death it began to appear in the conjunctivæ, and gradually spread to the surface.

The yellow colour did not obliterate the peculiar physiognomy of the algid cases, which was still recognisable after death. The lips, nose, posterior parts of the trunk, the hands and feet, and often the forearms and legs, retained the characteristic semi-cyanotic condition, besides which, the purpuric spots were everywhere observable. These phenomena combined gave a character to the algid cases recognisable after death almost as readily as during life.

Several states of the cutaneous surface were met with, both as to variety and intensity of coloration. Amongst the most remarkable was that observed in connection with some examples of the hæmorrhagic form. It may be denominated hæmorrhagic staining or bloody imbibition of the cutis. The colour was diffused in a uniform deep bloody purplish-red tint through large surfaces of the integument. It was not merely subcutaneous extravasation, but an actual coloration and staining of the cutis, from imbibition of the colouring matter of the blood. It occupied in one remarkable instance (Case 13, Table I. p. 44, Parliamentary Report), the cheeks, neck, shoulders, and upper part of the chest, in one continuous surface of colour. It has been nearly as extensive in other cases. It completely obliterated all other coloration in the parts affected, replacing the yellow colour when that had existed during life, as was the case in several instances. This hæmorrhagic staining was entirely different from the livid appearance of dependent parts, and equally so from the semi-cyanotic state of the surface found in the algid cases. It was obviously the result of extensive subcutaneous hæmorrhage, with extravasation of blood in an excessively thin and uniform stratum.

Hæmorrhagic exudation of a more distinct kind has been observed, post mortem, from abraded and excoriated surfaces and from the surfaces of vesicated parts. It has been observed from excoriations about the axillæ and groins (case of extremely obese female, No. 12, Table II. p. 53, Parliamentary Report); not infrequently from excoriations about the labia pudendi. Vesicated surfaces on the nucha, epigastrium, thighs, calves of the legs, dorsum of the feet, and other parts have been found stained with hæmorrhagic exudations. Gangrenous erysipelas of the legs has been found in some instances, as the result of the low state of the system, or more probably, of the long continued action of vesicating applications, such as blisters, mustard poultices, &c. Such means were used as popular remedies before the patient's admission to hospital, and from the temporary want of power in the system, especially in the algid cases, they produced little or no effect till reaction was somewhat established, when intense inflammatory processes were set up, followed in some instances by gangrenous destruction of the tissues.

Signs of recent hæmorrhage were commonly observable about the nose and mouth, with bloody sordes on the teeth and gums. There was not unfrequently an escape of some considerable quantity of blood from the nose, the mouth, or even the stomach after death. The lower parts of the face were commonly smeared and stained with dark blood, and the objects in immediate contact with the body were similarly stained. Hæmorrhagic stains have likewise been observable about the eyelids and meatus of the ears, also from some other situations which gave exit to blood, as it were, accidentally.

In the class of cases last alluded to, and in some extremely rare instances of advanced decomposition, the superficial vessels were prominent and distinctly observable on the surface. The small veins of the forehead and temples, the superficial jugulars, and some of the smaller veins of the neck were brought into view. In the instances of rapid decomposition, to be presently noticed, dark-coloured arborescent veins were observable on various parts of the surface, neck, chest, arms, abdomen, and thighs. This peculiar dark colour, resulting from decomposed blood, and which contrasts with that of the usual blue venous tint of distended superficial veins, is very characteristic; and in the instances now in question, caused me readily to recognise the condition as similar to what I had already seen and described in connection with acute gangrenous processes.*

Evidences of Decomposition.—Evidences of advancing decomposition were, however, generally speaking, very rare at the period at which our examinations were made (average, 10 to 12 hours after death). Even the usual greenish coloration of the abdominal walls was not remarkably evident, and in many instances was certainly altogether absent. This would be more remarkable but for the absence of similar coloration in a great many instances, at least, in the parts within the abdominal cavity usually so discoloured by escape of biliary colouring matter from the gall-bladder, viz., the under surface of the liver, the hepatic flexure of the colon, the contiguous parts of the peritoneum, &c.

Softening and detachment of the cuticle were observed only in the remarkable instances of acute decomposition already alluded to. See Case 19, Table II. p. 55, Parliamentary Report. The body was still warm everywhere 16 hours after death. The surface of the thorax, abdomen, neck, and parts of the arms and face, were covered with prominent very dark purplish veins. The least pressure on any part of the surface was sufficient to detach the cuticle in large sheets, leaving a discoloured, dark, dirty reddish surface beneath. A corresponding amount of advanced decomposition was found in the several organs, in the thorax and abdomen.

State of Superficial Parts on Section.—The subcutaneous areolar tissue, the muscles and connecting tissues were sometimes found engorged. Slight diffuse hæmorrhagic exudations were observed through the subcutaneous tissues. Limited patches of ecchymosis were likewise presented here and there. This escape of blood by extravasation into the superficial parts and tissues was confined to the class of cases I have denominated hæmorrhagic. Taking the cases as a whole, I am inclined to regard it as by no means a common kind of hæmorrhage: it was certainly by no means so frequent as any other of the various forms of extravasation of blood. Vascular repletion without actual extravasation was more usually observed. This was evident in the integuments, in the subcutaneous tissues, and very commonly in the muscular structure, which was dark-coloured and congested in appearance.

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* See Parliamentary Report (Blue Book) to the Minister-at-War on the Pathology of the Diseases of the Army in the East.

The several parts both internal and external were generally found to have preserved their natural moisture.

CRANIAL CAVITY.

Dura Mater.—Yellow coloration was not infrequently observable in the dura mater. It was chiefly on the outer surface that this coloration was remarked. Arborescent injection with punctiform blood spots was occasionally found, but never, in my examinations at least, to any very remarkable extent.

The sinuses of the dura mater were sometimes found engorged. This was especially observable in the great longitudinal and the lateral sinuses. It was far from a constant or even general condition, and existed only in a minority of the cases. Remarkable engorgement of the vertebral veins was found in some one or two instances.

Arachnoid.—The cavity of the arachnoid pretty frequently presented some slight increase in the quantity of serum effused. The membrane itself was in general transparent and free from alteration, but it has been found opalescent and occasionally smeared with blood. In no instance that I am aware of has any lymphy exudation been found upon the arachnoid surfaces.

The serous effusion has varied from a couple of drachms to as many ounces. It has been found clear, pale, devoid of any appreciable coloration, yellow or otherwise, and also in other (rare) instances more or less tinged with blood. I have not found it distinctly yellow in more than two or three instances. The subarachnoid spaces have not infrequently been found filled with clear serum, with gelatinous and opalescent serosity more rarely, and in some few instances only with extravasated blood.

Pia Mater. — General congestion of the surface of the hemispheres to a slight extent has not been uncommon. Marked vascular injection has usually been only partial, being confined to one hemisphere, or more commonly to a part only of the surface of either the right or left. Bloody effusion on the surface of the hemispheres has been occasionally observed. It was generally confined to a small surface, but has sometimes been found in more than one situation upon the same hemisphere. The posterior parts of both hemispheres were sometimes congested, probably from hypostatic determination of blood.

In some examples of the hæmorrhagic form, we have found the subarachnoid spaces filled with effused blood, much bloody serum in the arachnoid cavity, and the surface of both hemispheres and of the cerebellum deeply congested. This, however, has been a comparatively rare condition.

Cerebrum.—The cerebral substance on section presented very generally a slight amount of vascular spotting, constituting what, to avoid periphrasis, we have designated with the French pathologists, the sablé condition. Excessive development of this condition of increased vascularity of the cerebral substance has been witnessed only in cases of the hæmorrhagic form. I have in no one instance found actual hæmorrhage into any portion of the cerebral substance.

The cerebral substance has been noted in some one or two instances as *slightly* dry. Appreciable changes in consistence either as to hardness or softness were extremely uncommon, if they existed at all. I have no observation of any such changes beyond that just mentioned.

The ventricles contained variable amounts of serum; sometimes but a drachm of clear transparent fluid. In rarer instances the lateral ventricles were filled with serum, and in some few cases bloody serum was found in them. The choroid plexuses were sometimes found congested; most commonly there was no apparent alteration in them. It is noted in one instance that the velum interpositum was congested; but no other observation confirmed the idea of this being an important or usual change.

Cerebellum.— General superficial congestion was not uncommon, but no marked state of vascular injection was observed, except in the hæmorrhagic cases already noticed.

Spinal Cord and Membranes.—The spinal canal was not generally examined, a few complete autopsies having satisfied us that there were usually but unimportant pathological changes to be met with in this situation.

Spinal Membranes.—Slight general congestion of the membranes has been observed, but to an unimportant extent, except in cases of the hæmorrhagic form. In these latter intense engorgement of the vertebral sinuses and veins has been found, with marked congestion of the membranes. Distinct hæmorrhagic effusions I have not observed.

Substance of the Cord.—A slightly sablé condition of the cord has been observed on horizontal sections being made in the hæmorrhagic form. I have not noted any varieties as to consistence in the nervous substance of the cord.

Well marked yellow coloration has not been found in the brain, spinal cord, or in the membranes, except in the cases already specified of yellowness of the dura mater.

It will be seen from these anatomical details that the cranial and vertebral canals, and the great nervous centres, participated only in a secondary degree in the general hæmorrhagic lesion. Even when profuse in almost all other situations, it was but moderate in amount and extent in the cerebral and spinal cavities, or on the surface of the brain and spinal cord. For the best example of hæmorrhagic lesion of the cord and its membranes, see especially Case 6, Table II. p. 51, Parliamentary Report.

We certainly cannot connect in any way the leading clinical features of the disease with anatomico-pathological states of the nervous centres and their appendages.

It may be safely stated that there has been an entire absence of evidence of inflammatory lesion in the brain and cord, and their membranes. The congestion present cannot be taken in proof of the existence of any such lesion. This condition (vascular injection) was, when best marked, always that of congestive engorgement rather than of active hyperæmia. In the cerebral substance itself and in that of the cord, there was a complete and invariable absence of any alteration of colour, of consistence, or of any other physical condition which could lead to the supposition that it was the result of inflammatory action.

The symptoms of cerebral excitement during life, when present, and they were far from constant, were, as already fully considered, not those of inflammatory lesions. There was likewise a want of correspondence and uniformity of result between the symptoms of cerebral excitement observed during life and the states of the brain and its membranes found post mortem.

THORACIC CAVITY.

Lungs — Parenchyma. — With but few exceptions congestion of the pulmonic substance was observable in one or both lungs, on the anterior or on the posterior aspect, and in a quantity varying from that of a single limited space in one lobe to the complete hæmorrhagic engorgement of the entire pulmonary parenchyma in both organs.

The ordinary hypostatic congestion no doubt formed the basis of the condition in many instances, and was probably in some the only state present. General engorgement of the anterior parts was, however, very often observable. In many cases the lungs collapsed but little; when the thorax was opened the fingers broke through the pulmonic substance readily, giving exit to a quantity of blackish blood mixed with air. This was the most common condition, but yet it was not infrequent to find well marked patches of distinct apoplectic engorgement of limited parts of lobes, which felt firm to the finger, and when broken through gave exit to clots of blood, in masses of various sizes. In Case 8, see Table II. p. 52, Parliamentary Report, the right lung presented numerous distinct apoplectic patches, while in the left there was more diffuse pulmonary hæmorrhage.

A congested semi-pneumonic solidification of the anterior part of the right lung was noticed in Case 12, see Table II. p. 53, Parliamentary Report; but even this amount of inflammatory lesion was very rare. True pneumonic consolidation I have not witnessed in a single instance.

Bronchial Membrane. — Congestion of the bronchial membrane was generally observable, it was commonly of the passive kind, quite distinct from any true hyperæmic state; no such condition as that of active hyperæmia with inflammatory redness was determined in any single instance. There was no observable increase in the bronchial secretion.

Pleuræ. — Old adhesions of the pleuræ were observed in some cases: in one or two instances there was complete adhesion of the lungs to the parietes throughout. I have not observed any pathological condition of recent origin in the pleural membrane in any of the cases examined by me.

Advanced decomposition of the pulmonic substance was observed in Case 19, Table II. p. 55, Parliamentary Report. The pulmonary structure had lost its consistence, and broke down readily on the slightest pressure or traction, so that it would have been impossible to remove either organ from the chest without almost completely breaking up its substance.

Heart.—The pericardium in some few instances contained effusions of serum; it was variable in amount from a few drachms to a couple of ounces. The serum effused was in one or two cases yellow or straw-coloured. Bloody serum to the extent of one, two, three, or more ounces was found in the pericardium in a few cases. In one or two instances purpuric (hæmorrhagic) spots were observed on the parietal layer of the pericardium.

Surface of the Heart.—Distinct purpuric spotting of the surface of the heart has been observed in some instances. The spots were of a dark purplish tint, varying from one to two or three lines in diameter; in one or two instances only were patches of a somewhat larger size observed; in one instance the posterior part of the apex of the left ventricle presented a purpuric patch from ¼ to ½ inch in diameter.

These spots were sometimes associated with spots on the endocardium and on the parietal layer of the pericardium. Their usual situation was on the anterior aspect of the right ventricle, but they have been found on the auricles and on the left ventricle.

Purpuric spots have been observed on the endocardium, in the auricles and ventricles, most commonly and in most abundance in the right auricle; in one instance a large ecchymotic patch, ¼ to ½ inch in diameter, occupied the auricular wall in the neighbourhood of the foramen ovale.

Purpuric spots in the heart were usually associated with similar spots on other internal parts, but by no means necessarily with the same peculiar condition externally. There was an entire absence of the algid condition or of purpuric spots on the skin in Case 5, Table II. p. 51, Parliamentary Report, which presented well-marked purpuric spotting on the endocardium and pericardium, in the œsophagus, and on the liver and kidneys.

Fatty deposit on the surface of the organ was occasionally observable; I think it was most thick in the cases of very obese females. Interstitial fatty deposit and true fatty degeneration of the muscular fibres I have not met with.

It may be a question whether, in the case of acute decomposition so frequently alluded to, fatty degeneration of the heart was present or not. The amount of decomposition and disintegration of the muscular fibre was such as to preclude the possibility of this being accurately determined. We are aware of the connection between fatty states of the heart and the rapid and early occurrence of decomposition, so well illustrated by the labours of the Dublin pathologists; but in the case in question the decomposition and disintegrative histolysis of the tissues were in a more advanced state than I have ever witnessed, except in connection with the forms of acute and general constitutional gangrene observed and described by myself in my official "Report on the Pathology of the Diseases of the Army in the East."

The muscular structure of the heart has been frequently found of a deep dark red colour. This was most marked and exaggerated in the hæmorrhagic cases, in which the muscular fibre had the appearance of having been steeped in dark venous blood.

A yellowness of the fibre was occasionally, but not commonly, presented. Perhaps most frequently there was no appreciable departure from the normal condition, either as to colour or consistence.

Endocardium. — The endocardium has been found stained of a yellowish colour rarely: more frequently, in the hæmorrhagic form, it was of a dark purplish tint, as if stained from imbibition of dark venous blood. Both kinds of coloration usually extended to the valves, both the auriculo-ventricular and the semilunar. It was commonly, when present, equally well seen on both sides of the organ.

The occurrence of purpuric spots on the endocardial surface has already been sufficiently noticed.

Valvular lesions were of the utmost rarity. In one instance only was there a well marked instance of organic disease of the valves. It was an example of permanent patency of the semilunar valves of the aorta. It is needless to say that the condition was of old standing, and in no way way connected with the special disease of which the patient died.

There was a constant and complete absence of inflammatory lesion of any kind in the heart or its membranes.

Blood in the Cavities of the Heart.—There was great variety as to the amount and character of the blood in the heart's chambers after death.

Both ventricles have been found entirely devoid of blood. This was a comparatively rare condition. A moderate amount of dark, thick, but fluid blood, with or without small black clots interspersed, but without fibrinous coagula, was the condition most frequently found. The right ventricle more commonly contained blood than the left. In a few rare instances all the chambers of the heart were found gorged with semi-fluid black blood. Occasionally long yellow fibrinous coagula were observed, usually in the right ventricle, more rarely in the left.

The blood which escaped from the great vessels on section of them, was generally intensely black, semi-fluid, and mixed with black clots.

ABDOMINAL CAVITY.

State of the Peritoneum.—No appreciable departure from the normal condition was observable in the serous membrane lining this cavity. I have not observed hæmorrhagic effusion or purpuric spots upon this serous surface: effusion of serum was likewise of very rare occurrence.

I have already alluded to the presence of enormous masses of fat in the mesentery and on the loins in obese females.

The general external aspect of the intestinal surface was very variable indeed. The whole intestinal canal has in some instances presented a uniform livid purplish tint on the peritoneal surface. This coloration did or did not correspond to hæmorrhagic effusion within the tube; there was no constant or necessary connection between the two states of external congestion and hæmorrhagic effusion within. The mesentery was sometimes deeply congested. Some of the examples of most profuse intestinal hæmorrhage occurred in cases in which the peritoneal surface of the intestines presented the ordinary coloration, or again, when the colour was of an entirely yellowish tint. See Cases 2 and 22, Table II. pp. 49 and 56, Parliamentary Report, for illustrations of these conditions. There was a very constant absence of the usual greenish biliary discoloration of the hepatic flexure of the colon and contiguous parts.

Œsophagus.—The mucous membrane of the œsophagus was occasionally, but not by any means very constantly found congested. In one or two instances it presented several purpuric spots, similar spots being observable in the stomach, heart, liver, and kidneys.

The fringe of epithelium at the cardiac orifice was found occasionally in a state, as it were, of abrasion, the epithelial scales being detached. Whether this state and appearance were in any way connected with or caused by the repeated efforts at vomiting I cannot say.

Stomach.—This organ has been found distended, contracted, and occasionally presenting the hour-glass constriction: its most usual state was that of moderate contraction: its mucous surface was consequently slightly corrugated and convoluted in the majority of cases.

Its contents varied much; they were sometimes natural, sometimes hæmorrhagic. In somewhat more than a third of the cases the stomach contained semi-fluid blackish matter in greater or less abundance. This matter was sometimes identical in character with the black vomit presented during life, being dark brown, *noir de caffé*, mostly fluid but containing fine dark brown or blackish particles in suspension. At other times the contents of the stomach seemed almost pure and unaltered blood, of very dark red colour, partly mixed with clots, or of a thick homogeneous consistence in other instances. Of the nature of this fluid no doubt could exist; it presented under the microscope blood-corpuscles variously altered but readily recognisable as such.

The mucous surface was, in a few instances, normal; its condition was very various, but it commonly presented some one or other of the following appearances:—

(*a*) A state of more or less extensive dark congestion was most frequently observable; when partial, the congestion was usually presented in the great curvature or bas-fond of the organ.

(*b*) Scattered patches of congestion irregularly distributed were likewise of sufficiently frequent occurrence, the intermediate parts presenting a truly normal state. Large arborescent vascularity was sometimes, but not very commonly, found.

(*c*) In other instances a general dark punctiform congestion was present through the greater part of the gastric surface; minute points of stellate vascularity, pretty thickly distributed here and there, formed another variety of congestion, and were observable in many cases.

(*d*) Occasional patches of ecchymosis were sometimes found. Most of these states, even to deep general dark congestion, were observable in cases in which no blood or hæmorrhagic effusion of any kind was found in the stomach.

(*e*) In one instance a general rose-coloured congestion of the gastric surface was presented. The stomach contained much black blood.

(*f*) In the cases attended with hæmorrhagic effusion into the stomach, the gastric surface was usually stained of a deep purplish tint. This colour, I make no doubt, was in greater part owing to hæmorrhagic staining or imbibition of the colouring matter of the blood; intense vascularity of the mucous surface was observable on minute inspection, even with the naked eye, still better with a pocket lens of moderate magnifying power. But the most striking and predominant appearance was that due to the general purplish tint; the hue was, in some instances, very deep, approaching to bluish black.

(*g*) In some instances purpuric spots were observable here and there on the gastric surface, the intermediate parts being normal or presenting only slight general punctiform or stellate vascularity.

(*h*) The mucous surface was generally in good preservation, the epithelium firm, persistent, and not detached or softened. Signs of decomposition of the gastric surface were generally absent, and the epithelial layer could be brought away with the knife, perfect, in distinct flakes, and not as a softened debris.

(*i*) Post-mortem digestion and consequent erosion of the gastric epithelium was observable only in a very few cases. A remarkable prominence and filling of the lenticular glands was presented in one or two instances.

I have not observed any condition that would warrant the supposition that active hyperæmia of the gastric membrane was present. I regard the state of injection so commonly observable in the stomach as part of the general vascular lesion which caused such a tendency to hæmorrhagic action upon the entire mucous surface. In no instance have I found any evidence of ulcerative action.

I have not detected any one instance of ruptured vessels on the gastric membrane. The hæmorrhagic action must have been confined to vessels approaching the capillary condition, if it did not take place directly and exclusively from ruptured capillaries.

Duodenum.—States very similar to those presented by the stomach were found in the duodenum, both as to the contents and the characters of the mucous surface of the organ. Hæmorrhagic purpuric spots have been observed upon its mucous surface in the cases already alluded to, presenting this condition in the œsophagus, stomach, heart, liver, and kidneys.

Jejunum and Ileum.—They were most commonly in a condition of moderate distension. The mucous surface in these portions of the intestines presented various states of congestion. Sometimes minute arborescent vascularity was found over large tracts of surface. In other instances minutely dotted injections were observable. In the hæmorrhagic cases uniform dark purplish coloration existed throughout. In one or two instances a uniform bright pink coloration was observable in the ileum, while profuse hæmorrhagic effusion had taken place into its cavity.

The contents of these parts of the intestine have been various: in a few instances bilious-coloured fæcal matter was observable. Dark greenish matter was found in other cases. Biliary-coloured matter has been found in the upper portion of the intestines, while blackish hæmorrhagic effusion existed in the lower parts in the same case. The converse of this has also been presented, black hæmorrhagic effusion into the stomach and duodenum, while natural-coloured fæcal matter (with biliary colouring) has been present throughout the remaining parts of the intestinal tract.

In more than one third of the cases extensive hæmorrhagic effusion was present throughout the greater part of the jejunum and ileum, and it frequently extended to the colon.

This effusion varied much in appearance; it was a black inky fluid in some cases, in others of a blackish red, and of more bloody appearance. It was sometimes partly homogeneous, in other cases only semi-fluid; in others, again, slimy, thick, and mixed with the debris of mucous epithelium. It was sometimes, likewise, mixed up with fæcal matter, and variously altered in appearance and consistence. The quantity was very considerable, in some cases filling the whole tract of the jejunum, ileum, and upper part of colon, while a similar fluid was found in the stomach and duodenum. Such cases might be considered as terminating in one vast mucous hæmorrhage. Microscopically examined the nature of the fluid, however altered in appearance, was placed beyond doubt by the presence of blood corpuscles. Epithelial scales, nuclei, and an ill-defined debris were likewise observed in abundance; but though the utmost care was employed in microscopic examination, no detached particles of mucous membrane, capillary vessels, or other constituent part of the mucous surface, other than the epithelial elements just mentioned, could be detected.

We may here notice the characters presented by the black vomit, and the similar blackish and otherwise coloured fluid or semi-fluid matter found in the stomach and intestines post mortem, or which had been ejected, by either the mouth or anus, during life. Numerous specimens of black vomit were carefully examined by the microscope, and with various chemical reagents.

The colour varied a good deal in the different species of black vomit: in some, it was a dark chocolate brown; in others, a brownish black; in others, again, more especially in the hæmatemesis of the hæmorrhagic form of the disease, the colour was that of very dark but otherwise apparently little altered blood. When allowed to rest for any time the black vomit spontaneously separated into two portions; a more or less clear supernatant fluid, and a powdery or occasionally flocculent deposit, the colour of which was commonly that of the black vomit itself, only a little more intensified. The specific gravity of the fluid before deposit had taken place, was ascertained to be pretty constantly 1007: it sometimes reached 1008, but I have not known it higher than 1009. The reaction was invariably acid: no change whatever took place on boiling, or on the addition of nitric acid. By filtration a clear transparent fluid passed through, while a powdery matter of the colour of the original black vomit remained on the filter. The black vomit remained unchanged for days, with the exception of developing minute cryptogamic vegetations.

The Barreswill fluid gave, with the clear filtered fluid, a beautiful purplish tint with flocculent deposit: liquor potassæ boiled with this filtered fluid gave a dark flocculent deposit: when evaporated to dryness, this fluid (the clear filtered liquor) left a brownish and somewhat glutinous residuum with a faint smell of caramel. No characteristic reactions were obtained except that with nitrate of silver, which gave abundant white cloudy precipitate from the chlorides present. But in fact when the total absence of biliary colouring matter of any kind was put beyond question by the use of a few simple reagents, little further attention was bestowed on the chemical composition of this fluid. It may be remarked that it was never found to contain any trace of albumen.

On microscopic examination variously altered blood elements were observable: generally speaking, blood corpuscles were not discoverable as such even in the most recent black vomit (of the ordinary kind) in any considerable quantity. But this observation is not to be understood as applying to the hæmatemesis of the hæmorrhagic form, in which blood corpuscles in abundance, and but little if at all altered in physical characters, were readily observed. The ordinary, and so to speak the *true* black vomit, presented under the microscope innumerable minute irregularly formed particles, of a dark reddish or brownish tint, variously aggregated into masses with but very few blood discs recognisable as such. Flattened and otherwise altered corpuscles, with or without milled edges, were found in some specimens; many corpuscles were found aggregated together in masses, while others were variously broken up. No crystallisation or even molecular aggregation of the colouring matter of the blood was observed by me in any instance.

I may remark that the characters here given agree in all essential respects with those presented by the black vomit of cancer of the stomach. Specimens of both the black vomit of yellow fever and of cancer of the stomach now in my possession are quite undistinguished by any chemical or microscopical character, or by any physical character whatever with which I am acquainted. The specific gravity of the specimens from cancer of the stomach (scirrhus pylori), it may be observed, reached 1015, while that of the black vomit of the Lisbon yellow fever never exceeded 1009.

In the black matter found in the stomach and intestines post mortem, blood corpuscles were generally present in abundance; besides these elements, epithelial scales, nuclei, and other debris of the mucous surface, were observed; but I have already remarked on the total absence from the intestinal contents of any fragments of vascular tissue, no more definite elements of tissue than cells, nuclei, molecular, and minute indefinite particles having ever been found, though particular care was bestowed on the examination of the intestinal contents.

State of the Mucous Surface. — The mucous surface was generally intact, the epithelial layer perfect, and no evidence of decomposition was observable. No detachment of any parts of the mucous surface was observed to have taken place under any circumstances. And from the condition of things observed, I cannot, for my own part, conceive the possibility of such an occurrence as the detachment of fragments of the capillary vascular tissue of the mucous membrane. It has been stated on recent authority, that such fragments have been found in the stools of yellow fever patients. No such thing certainly occurred in the Lisbon epidemic, and the state of the mucous surface above described leads me to doubt the probability of this occurrence.

No lesion of the glandular apparatus was detected. The state of the solitary and aggregate follicles was either that of perfect health or of slight commencing retrogression, evidenced by the reticulated state and partially shrivelled condition of Peyer's patches. This state corresponded to what we know of the normal retrogression of these parts.

Occasionally one or two isolated patches of ulceration were found on the mucous surface: in the jejunum in one instance, in the ileum on one or two occasions, and in the colon. They were commonly shallow superficial excavations, and in all probability of long standing, and had obviously no connection with the disease of which the patient died. They were in no way connected with the occurrence of any form of hæmorrhage, and were altogether wanting in the best-marked hæmorrhagic cases.

Œdema of Mucous Tissue.—An œdematous state of the mucous surface was observed in some few instances. The membrane was raised up into many ridges, $\frac{1}{4}$ to $\frac{1}{2}$ inch in thickness; this peculiar state sometimes engaged a large tract of the mucous surface. I have observed it in the small and also in the large intestines.

Mesentery and Mesenteric Glands.—We have already considered the enormous deposits of fat found occasionally in the mesentery. A state of intense vascular injection was pretty commonly observable. Occasionally the mesenteric glands were found enlarged and congested; more rarely their substance was found on section deeply gorged with dark venous blood.

Liver.—The most remarkable, the most constant, and, to my mind,—I will frankly avow it,—the most inexplicable condition presented in the post-mortem examination of fatal yellow fever cases, was the state of the liver. I believe it may be affirmed that *some* departure from the normal state of this organ was an absolutely constant condition in all the cases which proved fatal. It was not only so with regard to the cases examined by myself, but the concurrent testimony of all my learned *confrères* in Lisbon pointed to the same result.

Colour of the Liver.—The most frequent and remarkable change, and that which immediately attracted attention in the majority of cases, when the abdominal cavity was first opened, was a more or less well marked yellow coloration. The colour most frequently presented was that of a rich fawn yellow, or buff colour. Various shades of this colour were observable in different cases. In individual examples the colour was, generally speaking, pretty uniform throughout the surface of the organ, both on the superior and inferior aspect, and in both lobes; it was likewise uniform throughout the deeper hepatic substance on section in every part of the liver. Patches of a brighter yellow were sometimes interspersed through the general fawn or buff coloured tint. Various gradations in tint were observable in different cases, from the fawn-yellow colour here described to a yellowish-brown tint, *chocolat au lait.*

The ordinary liver-brown colour was sometimes presented even in cases in which changes in the hepatic substance were shown upon further examination.

The fawn yellow was sometimes interspersed with minute stellate, or in other instances mere punctiform spots of reddish vascular injection. This injection was observable on the surface and in the substance of the organ.

In some few cases a well-marked *nutmeg* state of the organ was presented. In one well-marked instance this state was combined with an amount of change in the hepatic tissue such that its specific gravity fell to 4¾ (areometer of Beaumé).

The fawn-yellow colour has been observed as a partial condition, either predominating and interspersed with patches of the liver-brown tint, or in other instances this latter colour prevailed, and the fawn-yellow was distributed in patches of irregular size and shape. This piebald condition was observable on the surface and throughout the substance of the liver on section.

Purpuric spots have been found upon the surface of the liver. This condition was usually present in other internal organs at the same time—on the heart, œsophagus, duodenum, stomach, or kidneys.

The hepatic substance was pretty firm, and resistant to the touch. It was in some instances shown to be rather dryish on section. It was never soft, flabby, or greasy, and in no instance presented evidence of advancing decomposition, except in the case of acute decomposition already noticed. The hepatic tissue at the same time never presented that density of texture remarkable in the lardaceous or bacony liver. The organ was seldom much enlarged, and equally rarely much diminished in volume.

In three instances the total weight of the organ was determined at 50, 56, and again 56 ounces respectively.

It was very commonly remarked that there was an absence of the ordinary yellow or greenish biliary staining of the under surface of the liver. The hepatic flexure of the colon and other contiguous parts of the peritoneal and visceral surfaces were likewise free from biliary staining. For a well-marked exception, with characteristic change in the liver, see case 24, Table II. p. 57. Parliamentary Report.

Gall Bladder.—Bile, normal in amount and character, has been found in the gall bladder, but only rarely so. Generally speaking, the gall bladder was distended, and contained from two to four, or even six or eight, ounces of reddish-black thick fluid. Its mucous surface was stained of a similar colour. In these instances there had been unquestionably more or less profuse hæmorrhage into this sac. On microscopic examination blood corpuscles were found in abundance. This hæmorrhagic effusion was the more remarkable inasmuch as the gall bladder presented in some instances the only example of mucous hæmorrhage observable after death. In one or two instances only were biliary calculi found in the gall bladder.

Microscopic examination of Hepatic Tissue.—The fawn-yellow coloration usually well indicated the change that had taken place in the hepatic tissue; but it was not only in those cases in which the liver presented this coloration that abnormal states of the hepatic structure existed. The yellowish-brown colour, *chocolat au lait*, was attended with similar and fully as well marked changes. The same may be said of the nutmeg condition of the organ, and even to some extent of several cases in which the ordinary liver-brown colour was unchanged.

Minute fine sections (by Valentin's double knife), or matter scraped from the hepatic texture, exhibited the hepatic cells filled with globular oily and fatty matter. The natural appearance of the cell was completely altered, its outlines obscured, and its nucleus rendered invisible. It was surcharged with molecular and globular oily matter, while the whole field, and the interspaces between the cells, were filled with similar and equally abundant oily and fatty elements.

When carefully treated with ether, the oily and fatty elements were in part dissipated, and the contour of the cells brought more clearly into view, but it was only rarely that the nucleus could, even by long treatment in ether, be made visible.

It was sufficiently obvious from these investigations, that the marked character of the hepatic lesion was that of fatty degeneration, with accumulation of fatty elements in the otherwise normal hepatic cells.

Researches with the microscope, however carefully made, were found to give but imperfect and unsatisfactory determinations of the positive and comparative amount of fatty deposit in the hepatic tissue. I determined, therefore, to estimate the specific gravity of the organ in a good many cases, with a view to a more accurate appreciation of the amount of change thus induced; it being of course fairly presumable that in proportion to the amount of fatty accumulation in the hepatic structure the specific gravity of the organ would be found diminished accordingly.

The general results were uniformly found to bear out this presumption. It was ascertained that, in general, the fawn-yellow colour of the liver corresponded with abundant granular and molecular fatty matter in the hepatic cells, as shown by microscopic examination, and with diminished specific gravity of the liver substance, as shown in the manner presently to be described, by the areometer of Beaumé. The results thus obtained were further confirmed by the determination of the absolute quantity of ethereous extract in given weights of hepatic substance in different cases.

The following Table gives the results obtained by the areometer of Beaumé employed to determine the specific gravity of the liver in different cases.

The mode of procedure was as follows: —A very strong solution of common salt* was made in a glass vessel of suitable height. The areometer of Beaumé was allowed to float freely in this vessel. Small cubes of hepatic substance were cut from the central parts of the liver, and immersed in the fluid: if they sank an additional quantity of salt was carefully added; if they floated high upon the surface, water was gently poured into the solution. In either case, the precise moment was carefully observed when the cube of hepatic substance, after having assumed a position between floating and sinking, and having oscillated slightly up and down, seemed for an instant or two to be in equilibrium; the degree marked upon the areometer was then recorded as accurately as possible. But as the instrument marked only whole degrees, the readings of fractional parts of a degree could not be taken with all the accuracy desirable. In recording the observations, care was taken to allow the error of sight to be on the side of the greater rather than the less specific gravity.

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* This, though not the most suitable agent for estimating the specific gravity of animal tissues, was the only one readily available.

For the purpose of comparison, the specific gravities of two specimens of liver taken from cases which did not die of yellow fever are placed at the top of the column.

One of them—that of a case of suicide—may be supposed to represent the normal condition of the organ as nearly as possible. Death took place after incision of the throat, implicating the vessels of the neck, in less than twenty-four hours. In the other case no appreciable alteration of the organ was present.

It will be seen that there is a general correspondence between yellow coloration and low specific gravity, but the relation is not a constant one by any means. Thus the liver was yellowish brown, with a specific gravity of 7½° in No. 21, while in No. 25 it was very yellow, with a higher specific gravity by half a degree. I conclude, then, the specific gravity to be a more accurate measure of the fatty change than that furnished by the mere colour of the hepatic substance.

TABLE

OF SPECIFIC GRAVITY OF LIVER.

(Determined by the Areometer of Beaumé, in Solutions of Chloride of Sodium.)

No.	Sex.	Age.	State of Liver.	Specific Gravity.
A	Man (soldier)	35 (?)	Case of suicide by incision in throat; death within 24 hours; liver perfectly normal in appearance.	10°
B	Man	40 (?)	Did not die of yellow fever; liver quite normal in appearance.	10
1	Man	50	Liver, yellowish-brown colour	8½
2	Woman	40	Liver, yellowish-brown colour	9
3	Man	55	Liver, brown; normal	10
4	Woman	40	Liver, very yellow colour	7
5	Man	45	Liver, yellowish colour	7½
6	Man	?	Liver, brownish colour	9
7	Woman	45	Liver, yellow colour	7½
8	Woman	?	Liver, yellow colour	7
9	Man	40 (?)	Liver, brown colour	9
10	Woman	60	Liver, yellowish colour	9
11	Man	?	Liver, yellowish-brown colour	8
12	Man	23	Liver, yellowish colour	9
13	Man	20 (?)	Liver, yellow colour	8
14	Man	?	Liver, very yellow colour; weight 60 ounces.	6¾
15	Man	45 (?)	Liver, mottled yellow colour; nutmeg.	4¾
16	Man	30	Liver, yellow colour	8
17	Man	20 (?)	Liver, yellow colour	7
18	Man	25 (?)	Liver, brownish colour	8¼
19	Man	25 (?)	Liver, yellow colour	7½
20	Woman	34	Liver, very yellow colour	7½
21	Woman	62	Liver, yellowish-brown	7½
22	Woman	55	Liver, yellow colour	7
23	Man	20 (?)	Liver, yellow colour	7
24	Man	16	Liver, very yellow colour	7½
25	Man	40	Liver, very yellow	8
26	Woman	?	Condition not stated	9¾
27	Man	—		8½
28	Man	—		10
29	Woman	—		8¼
30	?	?		7¾
31	?	?		6½
32	?	?		7¼
33	?	?		8½
34	Man	30 (?)	Liver, very yellow colour	7½

hepatic tissue gave the characteristic saccharine reaction with the Barreswill fluid, cupro-potassic solution.

In cases of longer standing, which had passed into the second or third periods, the reaction with the Barreswill solution was extremely faint, and in some instances was altogether absent.

I have in some cases obtained slight but appreciable reaction with the liquor-potassæ test, with the production of a faint but characteristic odour of caramel.

Spleen.—The spleen has not been found to present any constant pathological characters of importance. It has been found of normal volume and without appreciable lesion of any kind. It was occasionally found enlarged by one or two volumes, much gorged with blood, and its tissues in consequence readily gave way under pressure. But I have failed to detect any morbid condition having manifest special relation to the lesion at large, or to the states of other organs, as, for instance, the stomach and liver.

In some few instances diminution, to a small extent, of the volume of the organ has been noted. A very small and contracted spleen has been recorded only in one or two cases.

The absence of more marked and prominent lesion of this organ, supposed to be so much implicated in the sanguific process, I look upon as being of no small interest in a negative way.

Kidneys.—These organs were carefully examined in all instances. They were, it may be said, very commonly implicated so far as general engorgement of their structure, whether in the cortical or pyramidal part, or in both.

Congestion to some extent has been all but constant in the renal substance in both organs. Two states were distinguishable in different cases; one that of active vascular injection, the other that of general and diffuse hæmorrhagic engorgement.

Amongst the few examples of non-congestion of the renal substance, the most remarkable were those in which there was a general yellowish colour of the surface with purpuric spots, well marked and thrown out conspicuously by the contrast of colour. The purpuric spotting of the kidneys was never an isolated condition, but was always associated with the same phenomenon in other parts and organs.

A fatty state of the cortical part with congestion of the pyramids has been observed. This and the foregoing conditions, as well as some few instances of the waxy degeneration of the organs, were of very unfrequent occurrence, and had no obvious connection with the disease of which the patient died.

The usual microscopic appearances were presented in these cases when sections with Valentin's knife were placed in the field. Separation of the tubules with degenerated cells, and much oily matter, pus, and broken cells, were conditions occasionally observable.

In one or two cases, small purulent cysts were found disseminated through the kidneys.

The Bladder.—A moderate quantity of urine variable in appearance has been found in the bladder: sometimes but a few drachms, in other instances 8 to 12 ounces or even more. It was generally clear, straw-coloured, or amber yellow, occasionally coagulable, but more commonly unaffected by heat or nitric acid.

TABLE

OF APPEARANCES PRESENTED POST MORTEM IN CASES OF YELLOW FEVER.

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
1	Female	40	*External Surface:*—Body yellow, and thickly covered with purpuric spots. Marks of hæmorrhage about the mouth and on gums. No unusual amount of blood was observed in the muscles or other tissues in this case. *Cranial Cavity:*—Congestion of cerebral surface; brain substance presented the sablé condition (spotted with the red points of vessels cut across). The ventricles contained much bloody serum. The sinuses were likewise congested. *Thoracic Cavity. Lungs:*—Both lungs were congested throughout. *Heart:*—The heart was in a slightly fatty condition; both ventricles containing some dark fluid blood, but no clots or fibrinous coagula whatever. *Abdominal Cavity:*—The surface of the intestines was yellowish in colour; they were moderately distended, but not congested. *The Stomach:*—This organ contained no blood; there was slight erosion of the epithelium at the cardiac termination of the œsophagus. There was no blood effused in any portion of the intestinal tract, and the mucous surface presented nothing remarkable. *Liver:*—This organ was of a general fawn-yellow colour, with here and there small patches which were quite yellow; the surface was also spotted here and there with reddish points. It gave by the areometer of Beaumé a specific gravity of 9·. The gall bladder contained about half a pint of thick fluid, of a dark-red aspect. This fluid presented under the microscope blood corpuscles in abundance. *Kidneys:*—These organs were slightly congested.	This case had been but four days ill; the patient was delirious. The gall-bladder was the seat of considerable hæmorrhage (8 oz.). It was the only one of the mucous surfaces on which blood was effused.
2	Male	50	*External Surface:*—The body was yellow and partially covered with purpuric spots. The muscles were rigid, and their outlines well shown through the integuments, especially in the extremities. The feet were curved inwards, the toes pointed, and the heels elevated. *Cranial Cavity:*—Some congestion of the cranial cavity existed, but only to a slight extent. There was some serosity and opacity of the arachnoid. The cerebral substance was rather dry; only a slight amount of serosity was observed in the ventricles of the brain.	This was an example of the sthenic form in which death took place very unexpectedly. The patient was only 1½ days in hospital. Pyrexia was pretty well developed. He became de-

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			Thoracic Cavity. Lungs:—These organs were here and there spotted black; they were deeply congested throughout. *Heart:* — The heart contained blackish fluid blood in small quantity, but no clots or fibrinous coagula. It was not otherwise remarkable. *Abdominal Cavity. Stomach:*—Spots of congestion were observable on the mucous surface of this organ. *Small Intestines:*—The small intestines were much congested, as were also the upper parts of the colon (6 to 8 inches of this gut near the cæcum). The intestines contained a quantity of reddish bloody fluid, hæmorrhagic exudation from the congested mucous surface. *Liver:*—The liver was of a pretty uniform yellowish-brown colour. It was ascertained by the areometer of Beaumé to have a specific gravity of 8½. *Spleen:*—There was nothing observable about the spleen. *Kidneys:*—These organs were a good deal congested throughout their structure, both in the cortical and pyramidal parts.	lirious and could be retained in bed only by constant watching, but the strength appeared little diminished till shortly before death.
3	Male	55	*External Surface:*—The surface generally was deeply congested, especially in the dependent parts. There was but slight yellow colouration, and there was an entire absence of purpuric spots. *Cranial Cavity:* — There was but slight subarachnoid effusion, and but a small quantity of erum in the ventricles of the brain. The cerebral substance itself presented nothing abnormal. *Thoracic Cavity. Lungs:*—The pulmonic substance generally was much congested. The heart contained little or no blood, and was not otherwise remarkable. *Abdominal Cavity. Stomach:*—The stomach was much contracted, and on being laid open presented much dark punctiform congestion. The duodenum presented numerous small hæmorrhagic spots. The intestines contained a dark greenish matter in considerable quantity. There was a general œdematous state of the mucous membrane, especially in the ileum; it was raised into soft wavy elevations ¼ inch or more in depth. The upper part of the colon near the cæcum presented three shallow, oval-shaped, ulcerated excavations, each about ½ an inch in the long axis. *Liver:*—The liver was of a yellowish-brown, spotted (nutmeg) appearance, and gave a spe-	Yellow coloration but little marked in this case after death. Hæmorrhagic spots were found in the duodenum, and there was an œdematous state of the mucous membrane in the ileum.

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			cific gravity of 10. The gall bladder contained a small quantity of yellowish bile. *Kidneys:*—Both kidneys were somewhat enlarged and much congested.	
4	Male	45	*External Surface:*—General yellow coloration of the external surface was presented. *Cranial Cavity:*—Some bloody serum was observed under the arachnoid. The cerebral surface on section of the hemispheres presented the sablé condition in both hemispheres. There was much serum in the ventricles. *Thoracic Cavity:*—The *lungs* were much engorged throughout. The *heart* contained much blood in the right chambers, with well-formed yellow fibrinous coagula. *Abdominal Cavity:*—The *stomach* was deeply injected and of a dark purplish colour. Punctiform vascularity was observable here and there. The *jejunum* was slightly congested. It presented a slight appearance of the "sago-grain" state of its solitary follicles (milky injection). *Peyer's patches* presented a reticulated appearance throughout. *Liver:*—This organ was of a slightly yellowish colour, but its external appearance, and even that on section, gave only an imperfect idea of the peculiar alteration it had undergone by fatty deposit in the cells of the hepatic substance. The specific gravity was found to be only 7½. *Kidneys:*—Both these glands were congested. Several small cysts were likewise found in both.	In this case the departure from the normal condition in the liver was rendered evident only by the areometer.
5	Female	40	*External Surface:*—The body was yellow, but the surface was not otherwise remarkable. *Cranial Cavity:*—There was much injection and some bloody effusion on the surface of the hemispheres of the brain. On section the cerebral substance was found very much sablé. *Thoracic Cavity. Lungs:*—No remarkable state of the pulmonary structure is recorded. *Heart:*—The heart was small, and was covered with numerous purpuric spots, which were found on both ventricles and auricles, especially on the right ventricle. Some similar spots were observable on the lining membrane of the right auricle. There was a distinct ecchymosed patch near the foramen ovale. There was one spot on the endocardium of the right ventricle. *Abdominal Cavity. Stomach:*—Several hæmorrhagic spots were observable on the mucous	The record of this case states that there was no black vomit, and no mention is made of any other form of hæmorrhage having been presented during life. Purpuric spots were presented on various internal organs after death. This case has important bearings on the general pathology of the disease.

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			surface of this organ; and on following up the *œsophagus* it was likewise found to present hæmorrhagic or purpuric spots. The *jejunum* was congested, and presented one circular red ulcerated patch, about ½ inch in diameter. The *ileum* was likewise injected, and striated vascularity of the lower sets of *Peyer's patches* was observable. *Liver*:—The liver was of a well-marked fawn-yellow tint. Several purpuric spots were observable on its surface. The specific gravity was only 7. *Kidneys*:—These organs were both of a yellowish colour, showed here and there several purpuric spots, but were not otherwise altered.	
6	Male	45	*External Surface*:—The body was that of a robust and vigorous man in the prime of life. The muscular outlines were well defined through the integuments. The conjunctivæ were yellow. The surface generally was but slightly yellow. The cheeks, forehead, sides of the head, neck, and parts of the shoulders were deeply tinged with purplish blood stains. The superficial veins in the same situations were engorged and prominent. The whole of the posterior and lateral aspects of the trunk and extremities were of a livid hue. The muscles and other tissues, on section, were everywhere deeply stained with blood. The hands and feet were contracted, the latter with the toes pointed, the heels elevated, and the soles inclined inwards. *Cranial Cavity*: — The sub-arachnoid spaces were filled with effused blood. The surface of both hemispheres and of the cerebellum was everywhere deeply congested. The brain on section presented the sablé condition well marked. *Spinal Canal*:—The rachidian system was vastly gorged with blood, and the membranes of the spinal cord much congested. The cord itself on section was sablé. *Thoracic Cavity. Lungs*:—The lungs were engorged and congested throughout, and collapsed but little when the thorax was laid open. *Heart*:—This organ was filled in all its chambers with semi-fluid black blood. Its muscular structure, as well as its external and internal serous covering, was deeply tinged with blood, and of a very dark red colour. *Abdominal Cavity*:—The *intestines* were deeply congested and of a livid hue. *Stomach*:—The stomach was of a uniform deep purple colour throughout. It contained a quantity of	This case constitutes the most marked example of the hæmorrhagic form, of which it may be taken as the type.

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			black semi-fluid and but little altered blood, which was likewise found in the intestines. *Liver:*—The liver was of a uniform brownish colour. The gall-bladder was filled with a quantity of black bile and blood mixed. The specific gravity of the hepatic substance was 9.	
7	Male	40	*External Surface:*—There was marked congestion of the penis and testicles, also of both feet and of left leg. The body was much emaciated; there was no yellow coloration. *Cranial Cavity:*—There was some slight opacity of the arachnoid, also some slight sub-arachnoid effusion; there was a more considerable amount of serosity in the ventricles. *Thoracic Cavity. Lungs:*—The lungs were grey and but moderately congested posteriorly. *Heart:*—Some serum (1 to 2 oz.) was found in pericardium: the right and left ventricles contained large clots. *Abdominal Cavity. Stomach:*—Stellate congestion was observable here and there on the mucous surface of this organ. Patches of ecchymosis were found in some parts of the *duodenum*. Congestion of the jejunum and ileum to a slight extent was observable. Some of *Peyer's patches* presented a punctiform injection. Ordinary fæcal matter was found in the intestines. The colon exhibited two or three small points of ulceration near its cæcal end. The *mesenteric glands* were congested. *Liver:*—The liver was brown in colour, not otherwise altered, and gave a specific gravity of 9. The *spleen* was twice its normal volume. The *kidneys* were congested.	This was one of the few cases in which emaciation of the body was observed.
8	Female	45	*External Surface:*—The body presented a general bright canary colour. *Cranial Cavity:*—Slight congestion of the surface of the cerebral hemispheres existed. *Thoracic Cavity. Lungs:*—The right lung presented numerous apoplectic patches; the left also exhibited points of hæmorrhagic effusion into the pulmonary substance, but to a less extent. *Heart:*—The pericardium contained an ounce or two of serum. The ventricles contained black semi-fluid blood. *Abdominal Cavity. Stomach:*—This organ presented large patches of congestion in the great curvature. The jejunum was moderately congested. One ulcerated patch was found in the ileum; it was a shallow excavation ¼ inch	This case presented an example of perhaps the brightest yellow coloration observed.

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			in diameter, with red edges. The colon was slightly congested, and presented some few red patches. The *bladder* was distended with straw-coloured urine. *Liver:*—The liver was yellow in parts; the gall bladder contained black bile. The hepatic substance gave a specific gravity of 7½. The *spleen* was slightly enlarged. The *kidneys* were slightly congested.	
9	Female	?	*External Surface:* — The body was but very slightly yellow. *Cranial Cavity:*—No observation recorded. *Thoracic Cavity:* — No observation recorded. *Abdominal cavity:*—The *stomach* presented a general pink injection. The duodenum was congested, as also were the *jejunum* and *ileum*. The colon presented a more vivid red injection than the other parts. Much black matter, altered blood, was found in the *ileum*. *Liver:*—The liver was of a uniform yellow-brown colour, not otherwise altered in appearance, and gave a specific gravity of 7. The *spleen* was slightly enlarged.	This case presented an example of the pink vascular injection of the stomach; but this organ did not contain effused blood.
10	Male	23	*External Surface:* — Body but very slightly yellow. *Cranial Cavity:*—Hemispheres of brain congested slightly. Cerebral substance slightly sablé. *Thoracic Cavity. Lungs:*—Both organs were much congested. The heart was contracted, and contained but little blood. *Abdominal Cavity. Stomach:* — The stomach was filled with black vomit; its mucous surface presented much stellate injection. The *intestines* were likewise filled with black matter; altered blood. *Liver:*—The liver was yellowish, and gave a specific gravity of 9. The *spleen* was of ordinary size. *Kidneys:* — Both kidneys were much congested.	This patient was taken sick on the 3rd, and died on the 10th of December. Stellate injection of stomach, which contained much black vomit.
11	Male	25 (?)	*External Surface:*—A peculiar mulatto-like tint was observable in this case, both during life and after death. *Cranial Cavity:*—Slight congestion of the hemispheres existed. The cerebral substance was but slightly sablé. *Thoracic Cavity:—Lungs:*—Both these organs congested but slightly. *Heart:*—Some serum (1 to 2 oz.) in pericardium. The ventricles contained black semi-fluid blood, but no clot. *Abdominal Cavity. Liver:*—The liver was yel-	Peculiar mulatto-like tint observable both before and after death in this case.

No. of Case	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			lowish, and gave a specific gravity of 8. *Spleen* normal. *Kidneys* slightly congested.	
12	Female	60	*External Surface:*—This woman was of enormous obesity. The surface was yellow, but with large livid patches on the dependent parts. Large excoriations, with bloody exudation, existed in the folds of the axilla and groin on both sides. Blood trickled from the nose. General congestion of the muscles was observed on section. *Cranial Cavity:*—There was some superficial congestion of the right hemisphere of the brain. The cerebral substance was slightly sablé. There was much congestion of the vertebral veins. *Thoracic Cavity. Lungs:* — Congestive semi-pneumonic solidification of the anterior part of the right lung existed. *Heart:* — Some few clots were observed in the right ventricle; the left was well contracted. *Abdominal Cavity:* —Enormous deposits of fat existed between the several layers of abdominal muscles. The mesentery was loaded with masses of fat, several inches in thickness. The intestines generally were contracted and much congested. The *stomach* was deeply congested, but presented no hæmorrhagic effusion. The *duodenum* was of a dark congested appearance. The *colon* was much congested, and of a dark colour externally; the mucous surface was thickened, softened, and reddish. The intestines contained throughout natural fæcal matter. *Liver:*—This organ was somewhat elarged, of a general mottled (nutmeg) aspect; it gave a specific gravity of 9. The *spleen* was small. The *kidneys* were yellowish (fatty) in the cortical part throughout, while the pyramids were much congested.	Amount of adipose deposit in this case was most remarkable. The internal organs were loaded with fat.
13	Male	45 (?)	*External Surface:*—Intense and almost universal livid congestion of the surface of the body existed. This was especially observable on the face and on the posterior parts of the trunk. The colour is noted as of a blue-black. This was another instance of intense hæmorrhagic staining of the integuments, as if the principal tendency of the hæmorrhagic action was towards the cutaneous surface. *Cranial Cavity:*—The brain and its membranes were slightly congested. *Thoracic Cavity. Lungs:*—The lungs were universally congested. *Heart:*—The substance of this organ was red and soft. *Abdominal Cavity. Stomach:*—The internal sur-	This case presented another instance of the intense hæmorrhagic staining of the integuments. The surface was the chief seat of the vascular lesion.

No. of Case	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			face of this organ was deeply injected. *Liver:*—The hepatic substance was of a uniform brownish colour, and gave a specific gravity of 8. *Spleen:*—This organ presented no remarkable alteration. *Kidneys:*—Both the kidneys were deeply congested.	
14	Female	30	*External Surface:*—The body was that of a finely developed young woman in the prime of life and vigour. The conjunctivæ were yellow; the surface was but slightly yellow. *Cranial Cavity:*—This cavity was not examined. *Thoracic Cavity. Lungs:*—Both lungs were congested; the left, more especially, was much enlarged, and adhered to the pleura. *Heart:*—There was a small quantity of fluid, 1 to 2 oz., in the pericardium. Black fluid blood, with some clots and fibrinous coagula were found in the right ventricle. *Abdominal Cavity. Stomach:*—This organ was much distended. There was a general rose-coloured congestion of its mucous surface; it contained much black fluid (altered blood), which was likewise found in the duodenum. The intestines were much congested, as was also the mesentery. The *ileum* and *colon* were greatly contracted. Some yellow bile-coloured matter was contained in the upper part of the ileum. All the remaining portions of the intestinal tract were filled with black inky fluid. *Liver:*—This organ was of a yellow colour, weighed 56 ounces, and gave a specific gravity of 8. *Kidneys:*—They were but slightly congested.	The stomach in this case presented the rose-pink coloration, and contained very much black blood. Yellowish bile-coloured matter found in the ileum; blackish inky fluid in the other portions of the intestinal tract.
15	Male	(?)	*External Surface:*—The body was slightly yellow, but not otherwise remarkable. *Cranial Cavity:*—The brain substance was pale and a little soft. There was a considerable amount of serous effusion beneath the arachnoid and in the ventricles. *Thoracic Cavity. Lungs:*—The lungs were much congested. *Heart:*—The left ventricle was well contracted, and the cavities contained but little blood. *Abdominal Cavity. Stomach:*—The gastric mucous surface presented stellate congestion. The termination of the *æsophagus* was red and vascular. The stomach and duodenum were both filled with black matter (altered blood); the remaining portion of the intestinal tube contained normal fæcal matter. *Liver:*—the liver was very yellow, weighed 50 oz., and gave a specific gravity of 6¾. There was a considerable quantity of dark bile in the gall bladder,	The stomach and duodenum contained blackish matter, fæcès in the rest of the intestinal tubes.

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			which could be readily made to flow through the ductus choledocus into the duodenum. *Kidneys*:—They were both congested, but not otherwise altered.	
16	Male	50 (?)	*External Surface.*—The conjunctivæ were yellow; the body was slightly yellow here and there; the posterior surface and the extremities were lividly congested, and the legs presented very extensive patches of gangrenous erysipelas. *Cranial Cavity*:—There was some sub-arachnoid effusion of serum. The cerebral substance was a little soft. *Thoracic Cavity. Lungs*:—Both lungs were slightly congested. *Heart*:—This organ was enlarged to three times its normal volume. Cretaceous patches were found in the aorta. There was extensive deposit of calcareous matter on the semilunar valves of the aorta. Permanent patency of the orifice existed, and there was remarkable hypertrophy of the left ventricle. *Abdominal Cavity.*—There was general congestion of the intestines. *Stomach*:—The gastric mucous surface presented a large patch of reddish congestion at the great curvature. Biliary matter was found in the intestines. *Liver*:—The liver was in the nutmeg condition, with yellow patches here and there. Its specific gravity was 4¾. A few biliary calculi were found in the gall bladder. *Spleen*, *Kidneys*:—Both congested.	Results of gangrenous action observable on legs.
17	Soldier	40	*External Surface*:—The body was well developed and muscular; the hands and feet were contracted. The conjunctivæ and surface generally were yellow. *Cranial Cavity*:—A yellow coloration of the dura mater was observable on opening the cranium. There was slight but general serous effusion under the arachnoid. There was also slight congestion of the surface of the hemispheres. On section the cerebral substance was found to be only very slightly sablé. There was much serum in the ventricles. *Thoracic Cavity. Lungs*:—Both lungs were much congested, but more especially the left. *Heart*:—The ventricles contained but a small quantity of semi-fluid dark blood. *Abdominal Cavity. Stomach*:—The organ was contracted. The gastric surface was generally congested, but there was an entire absence of black fluid of any kind. *Liver*:—The liver was yellow, and its specific gravity 7½. The *spleen*	Yellow coloration observable in the dura mater.

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			was enlarged by ¼ of a volume. The *kidneys* were firm but congested.	
11	Female	34	*External Surface:*—The body was yellow, with large patches of dark livid congestion in the dependent parts. *Cranial Cavity:*—No record of any examination of this cavity. *Thoracic Cavity. Lungs:* — The lungs were both congested posteriorly; extensive splenisation of the right was observable. *Heart:*—The heart was adherent to the pericardium at the apex. There was but very little blood in the ventricles, and no clots or coagula. *Abdominal Cavity. Stomach:* — The stomach and duodenum were much congested; congestion was likewise observed in the œsophagus. The stomach contained black vomit in abundance. The intestines likewise contained much black matter, altered blood. *Liver:* — The liver was large, soft, and yellow; it weighed 56 oz., and gave a specific gravity of 7½. The *spleen* was soft, somewhat enlarged, and moderately congested. *Kidneys:*—Both were slightly congested. There was no urine in the bladder.	Black vomit in stomach, and black matter throughout the intestines.
19	Female	20 (?)	*External Surface:*— The body was well developed and muscular. The surface was quite warm, and but slightly yellow. The thorax, abdomen, neck, parts of the arms, and face were covered with prominent very dark purplish veins. The cuticle peeled off readily everywhere, giving manifest signs of advanced decomposition. The examination was made 16 hours after death. *Cranial Cavity:*—This cavity was not examined. *Thoracic Cavity. Lungs:* — These organs appeared to have been congested, but they were both much decomposed throughout the entire pulmonic structure. *Heart:* — The muscular structure of the heart was quite soft, and the fingers passed easily through its entire substance on the slightest pressure. There appeared to have been some amount of fatty degeneration in the right ventricle, but owing to the advanced state of decomposition and almost dissolution (histolysis) of the tissues, it was impossible to determine the precise condition. *Abdominal Cavity:* — The intestines generally were much distended with gas, and presented a general bluish green discoloration intermixed with patches of a reddish and purplish colour. *Stomach:* — The stomach was filled with a dark bloody fluid; the gastric mucous	This patient was but 4 or 5 days in hospital. He had presented the usual symptoms, black vomit with hæmorrhage from the nose and mouth. The temperature of the weather was not unusually elevated, and other cases examined on the same day under the same conditions, and at least as long after death, presented no unusual amount of decomposition. The decomposition in this case was as advanced and as rapid as in some of those

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			membrane was extensively decomposed, softened, and converted into a dirty blackish slime. The intestines, especially the *ileum* and *colon*, were filled with a dark olive-green decomposed fluid. *Liver:*—The liver was soft, of a general brownish colour, interspersed with yellowish spots here and there. The hepatic structure was completely disorganised, softened, and decomposed; its specific gravity was 8¼. *Kidneys:*—The kidneys had been congested; they were in an advanced state of decomposition, softened, and disintegrated.	described by me in the (Blue Book) Report on the Pathology of the Diseases of the Army in the Crimea.
20	Female	62	*External Surface:*—The body was well developed, and very fat: the muscular masses well contracted came prominently into view in the arms and thighs. The conjunctivæ were yellow, as also the surface generally. Purpuric spots were observable everywhere, but most marked on the breast and arms. The hands and feet were contracted, and the latter inverted, with the toes pointed. Dark bloody fluid flowed from the mouth when pressure was made with the hand upon the epigastrium. *Cranial Cavity:*—Some dark bloody serum was effused on the dura mater, which likewise presented some arborescence. There was considerable sub-arachnoid effusion, with 2 ounces of bloody serum at the basis cranii. There was great engorgement of the sinuses; there was extensive arborescent injection of the pia mater, with bloody effusion upon the surface of the right hemisphere in two situations. The cerebral substance was but slightly sablé on section. The ventricles contained a few drachms of bloody serum. The velum interpositum was slightly congested. The cerebellum was somewhat congested and softened. *Thoracic Cavity. Lungs:*—The lungs were congested posteriorly. *Heart:*—The right ventricle was distended to two volumes, and the whole heart had assumed a great transverse width. There were some few shreds of coagula in both ventricles, with fluid black blood. The valves and aorta were remarkably yellow. *Abdominal Cavity. Stomach and Duodenum:*—Both these organs presented an intense general dark red injection, lees of wine coloration. The gastric epithelium was perfect; the lenticular glands of the stomach were here and there prominent above the surface as whitish spots. The stomach was filled with dark bloody fluid. The small *intestines* contained a similar fluid: they were much congested, as	This was an example of the algid form. The patient was only 5 days ill. On admission the surface was cold, the tongue cold, and the pulse obliterated.

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			was likewise the colon. The mucous membrane was firm. *Liver:* — This organ was of a yellowish-brown colour, chocolate-coloured. Its specific gravity was 7½. The *spleen* was slightly enlarged, but not otherwise altered. The *kidneys* were congested.	
21	Female	65	*External Surface:* — The body was thin and somewhat emaciated. The conjunctivæ were yellow, the surface generally was but slightly so. Bloody sordes were observable on the lips and teeth; the hands and feet were contracted.	
			Cranial Cavity: — The dura mater presented a yellowish coloration; slight arborescent injection was observable on it. There was much sub-arachnoid effusion, and much gelatinous and opalescent serosity in the convolutions. There was slight general congestion of the right hemisphere, and general but slight injection of the pia mater. The cerebral substance was but slightly sablé, and there was but little serum in the ventricles: no abnormal change in cerebellum.	Yellowish coloration of dura mater observable.
			Thoracic Cavity. Lungs:—Both were congested and adherent throughout to the parietes. *Heart:* — There was a blackish hæmorrhagic patch on the posterior surface of the apex of the left ventricle; the organ was of normal size, and was thinly covered with an external deposit of fat. The cavities contained but little blood; marked yellow coloration of the valves and aorta was observed. The blood which escaped from the great vessels on section was very black.	
			Abdominal Cavity:—General congestion of the intestines was observable. *Stomach:* — The stomach presented the hour-glass contraction, the gastric surface presented patches of congestion here and there, with large arborescent veins at the great curvature. The ileum exhibited bright pink coloration, and contained much blackish bloody fluid. The colon was congested in its upper two thirds, and contained clay-coloured fæcal matter. *Liver:* — The liver was very yellow, slightly diminished in volume; its specific gravity was 7. The gall bladder contained about 1½ ounces of dark greenish bile. The *spleen* was small and contracted. The *kidneys* were small, yellowish, and the cortical part manifestly fatty.	Bright pink coloration of ileum, with much blackish fluid blood effused on mucous surface of this intestine.
22	Male	18	*External Surface:*—The surface was yellow, and not otherwise remarkable.	This case also presented slight

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
			Cranial Cavity:—Slight yellow coloration was observable in the dura mater, which also presented some arborescent vascularity. There was much sub-arachnoid effusion. The posterior parts of the hemispheres were congested. The cerebral substance was but slightly sablé. The ventricles contained much serum. The spinal cord and its membranes were normal. *Thoracic Cavity. Lungs*:— The pulmonic substance was generally congested. *Heart*: — This organ was normal; the valves were coloured yellow, especially in the left ventricle, which contained a large yellow fibrinous coagulum. *Abdominal Cavity. Stomach*: — The gastric surface was injected here and there, and in parts eroded (post-mortem self-digestion). The stomach was filled with black matter, partly thick and clotted, partly fluid. The intestines were yellowish externally, but contained a large quantity of thickish, semi-fluid, black matter, altered blood. The mucous surface was firm and normal. *Liver*:—The liver was very yellow, its substance dry and hard; its specific gravity was 7½. The *spleen* was contracted and firm, but not otherwise altered. The *kidneys* were slightly congested. The *bladder* was full of straw-coloured urine.	yellow coloration of the dura mater. Intestines yellowish externally, but contained much semi-fluid black blood.
23	Male	40	*External Surface*:—The body was yellow. *Cranial Cavity*:—The dura mater was slightly yellow. There was but slight congestion of the surface of the brain. The cerebral substance was normal, there was no fluid in the ventricles. The spinal canal presented nothing abnormal. *Thoracic Cavity. Lungs*: — The lungs were normal. *Heart*: —The organ was slightly hypertrophied, the valves in the right ventricle were yellow; the cavities contained but little blood. *Abdominal Cavity. Stomach*:—This organ was yellowish externally, it contained grey semi-fluid matter, and its mucous surface was but slightly congested; a similar greyish matter was found in the small intestines; there was likewise some blackish fæcal matter. *Liver*:—The liver was very yellow, both on surface and on section; its specific gravity was 8. The gall bladder was distended, and contained about two drachms of dark green bile. The *spleen* was normal. The *kidneys* were slightly yellow. The *bladder* was contracted, and contained only a small quantity of yellow urine.	Yellow coloration of stomach observed externally.

No. of Case.	Sex.	Age.	Appearances presented Post Mortem in Cases of Yellow Fever.	Observations.
24	Male	34	*External Surface:*—The surface was yellow anteriorly, livid posteriorly. The body presented the external features of the disease in a well-marked manner. The muscular masses were prominent, especially the biceps in the arm, the recti and vasti in the thigh, and the gastrocnemii. The iris and conjunctivæ were yellow, hæmorrhage trickled from the mouth and nose. There were several blue-black patches on the back and sides. *Cranial Cavity:*—Yellow coloration was observable through the dura mater; there was considerable sub-arachnoid effusion, and 2 oz. of serum in the basis cranii; the surface of the hemispheres was congested; the cerebral substance was only slightly sablé, there was a small quantity of serum, 1 to 2 drachms in the ventricles. *Thoracic Cavity. Lungs:*—The lungs were congested posteriorly, but there was no general engorgement of the pulmonary substance. *Heart:*—About 1½ oz. of yellowish serum was found in the pericardium. The right ventricle was distended with black fluid blood, the left ventricle was contracted, but contained some blackish fluid blood. The lining membrane of the heart was yellow, as were also the valves, and the muscular structure itself. *Abdominal Cavity. Stomach:*—The walls of the organ were tinged of a dark crimson, with here and there patches of pink coloration; it was filled with black fluid blood. The intestines throughout were filled with a blackish inky matter, altered blood. *Liver:*—The liver was of a general yellow colour, with minute points of stellate vascularity distributed through it; it was tinged of a greenish olive colour on its under surface; the gall bladder contained 1½ oz. of dark bile. The *spleen* was normal. The *kidneys* were congested and slightly yellow. The *bladder* was distended with straw-coloured urine.	This case died on the 5th Jan. 1858. It presented all the characteristic symptoms of the disease in its sthenic form, and it is sufficient proof that up to this date the cause of the disease was in active operation, though its propagative force was in abeyance. Yellow coloration of cardiac substance. Dark crimson colour of parietes of stomach.

CHAP. XI.

(SUPPLEMENTARY.)

As bearing, amongst other things, on the very important questions of the origin, local history, and meteorological relations of a well-recorded epidemic of yellow fever, I think it will be useful to append the following observations, which contain a summary of the chief climatological and other elements determined in connection with the Lisbon epidemic of 1857. It is chiefly extracted from my official Report to the Right Honourable the President of the General Board of Health, London.

I had the honour to present to the Board of Health a Report on the Pathology, Therapeutics, and General Aitiology of the Epidemic of Yellow Fever which prevailed in Lisbon during the latter half of the year 1857.

As was therein explained, my mission to that city on the occasion in question was one voluntarily undertaken in the interests of science and humanity. But though my investigations had no official character, the reception which I met with in the Portuguese capital, and the facilities afforded me for the fullest prosecution of my inquiries, were such as to call for my warmest acknowledgements.

In that document I took leave, in the first place, publicly to tender my grateful thanks to his most faithful Majesty Dom Pedro V., for the many gracious courtesies shown to me at his Majesty's hands, and the cordial interest personally evinced by him in my labours.

I had, in the next place, to acknowledge my obligations to his Excellency the Count de Sobral, civil governor of Lisbon, to the medical faculty generally, and to many leading persons of that city, for the facilities afforded me for carrying on my observations, and for the uniform courtesy and kindness which I experienced at all times during my sojourn in Portugal.

In the several parts and sections of the annexed Report, I entered very fully into the pathology of the epidemic, and into the climatological and other conditions supposed to be concerned in its causation. I also discussed the meteorology of the Portuguese capital for such periods antecedent to the invasion of the epidemic as could be illustrated by reliable records.

The very full details which I have furnished with regard to the clinical history and morbid anatomy of the disease (Op. cit. Part I., Sections I. and II.) place the nature of the epidemic beyond doubt. It will be at once recognised as a yellow fever of very fatal character.

The descriptions I have given of the several markedly different forms under which the malady manifested itself will, I think, be read with interest. And perhaps the details I have entered into on this head, and in the section devoted to pathological anatomy, will be found not devoid of practical importance. They indicate to us how the various conflicting accounts given by different writers, of yellow fever epidemics in different times and places, may be reconciled on the supposition that in one epidemic visitation one form of the malady was predominant, while, in another outbreak the clinical characters presented were those of a far other type of the disease. Nothing almost in disease can be apparently more distinct from its congener in the nosological category, than the "algid" from the "sthenic" or "hæmorrhagic" variety of yellow fever as presented in the late Lisbon epidemic. However, in closely analysing the essential phenomena of the several forms of the disease, we find they are but varieties derived from a common stock.

The first great question which naturally presents itself in considering an epidemic such as that, the history of which we had to examine, refers to its manner of origin and its mode of propagation.

From the first invasion of the epidemic in Lisbon, a belief became wide-spread and general that the disease had been imported. This opinion, it is necessary to add, was not confined to any class of the community. It was shared alike by persons in all ranks of society, by many amongst the educated as well as the illiterate, and by many highly respectable members of the medical faculty, as well as by the public at large. This opinion, though so generally diffused, was not, however, universally accepted, for both in the faculty of medicine and from several non-professional persons of great intelligence, I have heard the most distinct avowals of a belief in the entirely local origin of the epidemic, while certain existing conditions were pointed to as manifestly sufficient to account for its causation. As an impartial investigator, I considered it to be my duty to inquire very fully into such evidence as was adduced in support of both sides of this important question.

After most careful inquiry amongst various official persons, and in all quarters in which reliable evidence could be expected in such matters, I am obliged to state that in no one instance did I obtain such a consistent assemblage of facts, or such an array of well-supported allegations, as would, in my mind, warrant the conclusion that the importation theory was even moderately well founded. On the contrary, so vague, and in some essential particulars so conflicting, were the allegations as to the time, place, and other circumstances attending the reputed importation of the disease, that I do not believe that the popular opinion so generally held, as to the importation of the epidemic, admits of being reduced to anything like a uniform or consistent statement in writing.

Of the reports in circulation as to the alleged importation, the two most generally received were, firstly, that the disease was communicated to persons in the Custom-house engaged in the examination of the baggage and personal effects of passengers arriving from the Brazils; secondly, that the manner of importation was by certain cargoes of hides from the Brazils. In connection with the first report, it is to be observed that there was no uniformity in the accounts given by different persons of the circumstances of time and place under which the importation was alleged to have occurred. There was no concurrence of testimony as to the particular ship, the date of her arrival, the port she sailed from, or the health of the passengers she brought. By one set of persons the ship specified was the Brazilian mail steamer "Tamar;" by others a different ship was particularised with equal confidence.

In one account of the importation of the disease in connection with hides from the Brazils, it was stated that the hides were landed at the Custom-house; in another, that the hides were landed at a certain wharf higher up the river.

After the most careful inquiry in all quarters, I am unable to produce any more circumstantial account of the alleged importation of the malady than is contained in the foregoing statements.

The considerable number of attacks and deaths which took place in the Custom-house and in the adjacent parts of the city, was constantly adduced in proof of the origin of the epidemic in the Custom-house, and its propagation from that establishment as a centre. As was sufficiently shown, however, no such argument was supported by the facts proved. The undoubted frequency of the attacks, and the mortality in the quarter in question, were equalled and surpassed in districts considerably removed from proximity to the river. (See *Procès Verbal*, No. 1. Appendix No. VI. Op. cit. p. 120.)

The following is a summary of the chief circumstances which I found could be established on unquestionable authority as to the times and places of, and the other particulars attending, the outbreak of the disease.

1. It was proved beyond possibility of doubt, that true

yellow fever, of a malignant and fatal character, prevailed both in Lisbon and Oporto during the year 1856. (See Op. cit. Appendix, No. 5.)

2. Of 311 cases recorded to have occurred in Lisbon in 1856, somewhat more than two thirds were observed in the districts St. Roque and Bica, far removed from the river-margin.

3. The three districts attacked in 1856, Belem, St. Roque, and los Anjos (Bica), are widely separated from each other, and present no recognisable connection, commercial or otherwise, amongst themselves (see map of Lisbon)nor with the exterior by way of sea traffic. These districts are likewise on different elevations; one, that of St. Roque, being some 100 to 150 feet above the Tagus level.

4. The yellow fever of Oporto (1856) is attributed by Dr. Gonveia Ozorio of that city to the filth of the quarter Miragaia, in which the disease prevailed, and not to importation.

5. While in general the parts of the city chiefly attacked in the Lisbon epidemic of 1857 were the thickly inhabited districts in the flat of the town bordering the river, it is undoubted that ravages equally great, if not more severe, were committed in certain districts having more or less elevation above the Tagus.

6. The districts of the Mouraria, Alfama, St. Roque, and St. Catherine, which were greatly scourged by the epidemic, are on various elevations, and are more or less separated from the flat of the city and the river-margin.

7. While there was no uniform testimony as to the time, place, and other circumstances of the alleged importation of the epidemic in 1856 and 1857, it is certain that no case of the disease was received into the Lazaretto in either of those years, or in any recent year. (See Op. cit. Appendix 6, pp. 15 and 22, where it is stated as follows:—"The inspector of the Lazaretto, who has resided there 42 years, affirmed in the most positive manner that there has never been one single person of those undergoing quarantine, who was attacked with an epidemic disease.")

8. All the parts of the city largely attacked by the epidemic, presented in common certain conditions of insalubrity, which may be classed as follows:—

A. Defective water supply.

B. Total absence of, or more commonly, extremely deficient sewerage.

C. Total absence or incompleteness of house-drains, privies, and a consequently unclean state of the streets.

D. Badly-constructed dwellings, with deficiency of light and air, and want of thorough ventilation.

E. Absence or defective condition of tertiary and secondary sewers; when present, such sewers, as well as those of the largest section, were proved by repeated inspection on the part of the Fourth Commission of the Sanitary Congress, and by my own personal observation on several occasions, to be in great part wholly ineffective, being choked with soil, sand, or rubbish, and giving exit at their main embouchures on the Tagus either to little or no fluid or solid material, or to only a small quantity of clear and almost pure water. (For details, see Op. cit. *Procès Verbal*, No. 1, and *Procès Verbal*, No. 2, of Visits of Inspection of Fourth Commission. Appendix 6, pp. 119 and 120.)

9. The state of the shore of the Tagus, for fully one half of the extent of the city along the river side, was such as to be a highly effective cause of insalubrity, not only to the adjacent districts, but to the whole capital. The vast area of extremely fœtid decomposing mud left exposed at low water, exhaled noxious gases very prejudicial to health.

10. It is to be observed, that notwithstanding the free communication between the shipping in the Tagus and the shore, and between the city and the adjacent districts in the

immediate vicinity, and at more remote distances, to which many thousands of the inhabitants (probably 30,000) withdrew, there was no evidence whatever of the disease having been conveyed to the shipping or the interior.

The freest communication was kept up, even during the height of the epidemic, between Lisbon and Cintra, and many other favourite places of resort, to which the citizens retired in great numbers; yet no cases can be adduced to show that the disease spread, or was carried by contagion or otherwise from Lisbon to such localities. Cintra was, perhaps, the place most frequented, and with which much free daily communication was consequently kept up; but I could obtain no reliable evidence that one single case of genuine yellow fever occurred in that town.

I have heard statements to the effect that the disease was propagated by contagion to some minor towns, but I have seen no evidence, documentary or otherwise, to prove the truth of such allegations, or render them even probable. On the contrary, the uniform testimony of popular report (so far as it is at all reliable or worth noticing), went to show that the disease was not propagated beyond the walls of Lisbon.

In a very few instances I have heard evidence, which seems to be not unworthy of confidence, that persons long resident in Lisbon, and exposed to the causes of the disease, manifested its characteristic symptoms only on reaching some locality more or less distant to which business called them. But I know of no single case in which the disease was propagated to other persons resident in such locality outside Lisbon. Nor indeed have I ever heard it confidently alleged by the most warm advocates of contagion, that such propagation of the disease took place out of Lisbon.

It is worthy of remark in connection with this subject, that while opinion was so strongly in favour of the importation theory, little if any apprehension of personal contagion was entertained by those in attendance upon, and in daily contact with the sick; and this indifference to exposure to the supposed contagion of the fever was observable in all classes of society, amongst the lowest as well as the highest. The effects of such moral courage were most beneficially felt by those amongst the poor and friendless who became victims of the disease. A large number of the inhabitants, it cannot be denied (variously estimated at 30,000 to 40,000), sought safety for themselves and their families by a precipitate flight from the foci of infection; and the closed doors, abandoned houses, and the suspension of the hum of business in whole streets of the most active centres of commerce, realised to the spectator all the most striking features of a plague-stricken city. Nevertheless, amongst the population which remained, humanity was spared those humiliating and appalling scenes, which the medical historian tells us were so constantly presented in the epidemics of the middle ages, of the sick and the dying abandoned by their nearest relations and friends. So far from this being the case, it must be stated, and no higher eulogium could be passed on the people of any city, that during the late Portuguese epidemic devoted attention to the sick was the universal rule with all classes of society; and even on the friendless and the stranger I have seen all the care and anxious solicitude bestowed that could be lavished on the nearest and the dearest friend or relation.

I have elsewhere remarked on the excellent tranquillising effect produced on the public mind by the truthful and highly creditable manner in which the daily bulletins, giving a statement of the progress of the epidemic, were published by the authorities. The worst was at all times known, and exaggerated fears rendered impossible; and I have no doubt that but for these returns the panic and consequent exodus from the city would have been far more considerable than they were.

It is interesting to remark the very similar results of observations made by competent authorities with regard to the Lisbon epidemic of yellow fever, in 1723. Dr. Gilbert Kennedy says: "The high parts (of the city) are much freer than the low parts, and the villages and country houses about town are entirely free from this distemper, notwithstanding the great communication." (See Op. cit. Appendix No 3, for letter of Dr. Gilbert Kennedy to Her Britannic Majesty's Consul at Lisbon, under date October 31, 1723.) The observations made in 1723, with respect to the unclean state of certain parts of the city, will be found to apply equally well to the condition of things in many localities in the present day. (See Op. cit. Appendix No. 2.) I must refer to Part III. of the Parliamentary Report for full details on the special topography, physical history, and other particulars of Lisbon required for the elucidation of the rise and progress of the epidemic. I shall here content myself with the statement, which will be found borne out by the evidence adduced, that where most palpable causes of insalubrity prevailed, there were the most fatal ravages of the epidemic witnessed. In the forcible and graphic terms of one of the historians of the epidemic of 1723, Dr. Manoel da Silva Leitão, 'most deaths where most dirt.' (See Op. cit. Appendix No. 2.)

It has always been found difficult to fix with certainty the precise date of occurrence and the locality of the first cases of any epidemic visitation. It cannot be doubted that while in the epidemic of 1856 two out of the three localities chiefly attacked, St. Roque and Bica, were at some distance from the river; in 1857 the most considerable number of cases occurred, in the first instance, in the proximity of the Custom-house, and in that establishment itself.

No case is recorded in this locality prior to September, 1857; but before this date there seems good ground for believing that cases of undoubted yellow fever had been observed. One case is recorded as having been verified (by Dr. Arante) so early as May, 1857. Another case is stated to have been seen in July, while there appear to have been at least five in August. Some of these cases occurred in the quarter of St. Roque, an elevated district 100 to 150 feet above the Tagus level, as already indicated. It has been attempted to give a special significance to certain of these cases, by saying that the parties attacked, though residents in the district of St. Roque, were employed in the Custom-house. I can neither affirm nor positively deny the truth of this statement, as I could procure no reliable evidence respecting it, and I am not aware that any such exists. My own conviction, based on the results of inquiries made amongst medical men of all shades of opinion, is, that prior to the declared and fully recognised existence of the epidemic, isolated cases presented themselves in various parts of the city, of which no accurate record was made, but of the existence of which no moral doubt can be entertained; it is not admissible of course to rely exclusively on such cases.

The total number of persons attacked may be estimated at between 16,000 and 17,000, and the total deaths at about 5500. (See Op. cit. Part II.)

In the absence of strictly reliable statistics, and I found it entirely impossible to obtain any such, a comparison of the attacks and deaths in various localities could not be accurately made. If, however, we assume the following data (taken from the only figures now at my disposal) to be approximately correct, we may obtain the percentages of attacked and deaths in given numbers of the population in certain localities, and likewise the percentage of deaths to attacks.

The accompanying figures exhibit the numbers of persons employed, with the number of attacks and deaths, and the percentages of both, and of the latter to the former (deaths to attacks), in the several localities specified. The figures taken for the Custom-house are the highest I find in any return from that establishment. I have appended for comparison the statistical elements of some few other epidemics.

	Number of Individuals.	Number of Attacks.	Number of Deaths.	Percentage of Attacks to number of Individuals.	Percentage of Deaths to number of Individuals.	Percentage of Deaths to Attacks.
IN LISBON EPIDEMIC, 1857.						
Custom House . .	542	121	49	22·324	9·040	40·495
Royal Marine Arsenal	1,125	291	113	18·755	10·044	38·831
House, No. 55, Rua do Arsenal.	52	42	16	80·769	30·769	38·142
Desterro Hospital .	. .	2,525	972	. .	. .	38·491
Garrison of Lisbon (approximately).	4,300	622	118	14·465	2·744	18·971
Population of Lisbon* exposed.	200,000	17,000	5,500	8·05	2·75	32·352
IN OTHER EPIDEMICS.						
Population of Cadiz .	72,000	48,000	5,000	66·666	6·944	10·406
Population of New Orleans exposed (*Epidemics of* 1853).	125,000	29,020	8,101	27·91	6·48	21·023
Population of 25 Spanish towns and cities attacked in 1804.	427,228	. .	52,559	. .	12·601	10·
Population of Rio de Janeiro (*Epidemics of* 1851 *to* 1854).	. .	100,000	10,000	10·		
Aggregate exposed population of Vicksburgh, Providence, Jackson, U.S.	4,090	2,780	777	67·970	18·997	27·956

In glancing at this summary as it concerns the Lisbon epidemic we are struck with the absence of any near coincidence in the results, except in the percentage of deaths to attacks, which, if we omit that of the garrison of Lisbon, shows a sufficiently close uniformity throughout.

These figures, if strictly accurate, would show a considerable power of resistance to epidemic invasion amongst the troops of the Lisbon garrison, and also a far lower rate of mortality to attacks than in any of the classes of individuals here specified or in the population at large, but the liability to attack amongst the troops in garrison is nearly twice as great as that amongst the population at large.

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* According to Franzini's estimate, and deducting 30,000 for probable number of inhabitants who left the city during the epidemic.

The percentage of attacks to individuals, and of deaths to attacks, was, it will be observed, very high amongst those employed in the Custom-house; the similar percentages amongst those engaged in the Royal Marine Arsenal were below those of the Custom-house population, but still considerably above those of the population at large. It will be seen, however, that by far the highest percentage of attacks to individuals (80·769 per cent.) was exhibited by the inhabitants of the house No. 55, Rua do Arsenal. This house, of large proportions, forms the corner of Largo do Pelourinho and of the Rua do Arsenal; though of great size, it was evidently vastly overcrowded, and could not from its position have been at all adequately ventilated. The condition of the sewage of this locality may be judged of by perusing the *Procès Verbal* of the visit of inspection of the Fourth Commission to the Royal Marine Arsenal, within the precincts of which the great sewers of this locality open on the Tagus. (See Op. cit. Appendix, No. VI. *Procès Verbal*, No. 3. p. 120.) The commission states:— "The large sewer has 3m. 20c. (about 10 feet 6 inches) in height, by 2m. 15c. (about 7 feet) in width. It had been recently obstructed with mud derived from the basin, and with sand, and by a boat which had been driven in by the force of the sea on the occasion of a tempest. At present it is free as far as the Rua direita do Arsenal. Its mouth was stopped in such a way as to prevent the mud of the basin from entering, but to allow of the water flowing out from within; this (the water) is perfectly limpid, and according to the statement of the inspector (of the Arsenal) has for three years presented the same colour."

This sewer, it is to be remembered, is intended to serve a considerable portion of the city, including the Largo do Pelourinho, the Rua do Arsenal, and, of course, the house No. 55 in question, the state of salubrity of which may be judged of from the imperfect performance of its functions by the sewer just described. This is by no means an isolated example of the manner in which the epidemic fever exhibited its virulence in an especial manner, in particular localities and particular houses. The spacious mansion of an eminent mercantile family was pointed out to me in the place opposite the Cathedral, in which as many as twelve members of the same family, including domestics, were attacked, of whom three died. The first of these cases was seen on September 1st. These data were furnished to me by the physician who attended the family. In another family in the parish of St. Catherine, six were attacked, of whom four died.

RATIO OF MORTALITY FROM YELLOW FEVER IN VARIOUS EPIDEMICS.*

Epidemic of	Date.	In Population exposed.	In Population attacked.
Philadelphia . . .	1793	1 in 10	
„ . . .	1797	1 in 16·6	
„ . . .	1798	1 in 6	
„ . . .	1793, 1797, 1798	1 in 10·13	
„ . . .	1805	. . .	1 in 3·86
„ . . .	1819	. . .	1 in 1·2
„ . . .	1793—1819	. . .	1 in 2·12
„ . . .	1853	. . .	1 in 8·328
New York (average) .	—	. . .	1 in 2
Baltimore (ditto) . .	—	. . .	1 in 2·87
Charlestown (ditto) . .	—	. . .	1 in 4
New Orleans . . .	1853	1 in 15·43	1 in 3·58
Vicksburgh . . .	1853	1 in 6	4 in 4·42
Providence . . .	„	1 in 2·424	1 in 2
Jackson (Mississippi) .	„	1 in 6·160	1 in 3·125
Mobile	„	1 in 15·113	
Windward and Leeward Command (average) .	—	. . .	1 in 2·33
Jamaica Command . .	—	. . .	1 in 1·33
Rio de Janeiro . .	—	. . .	1 in 10
Spain (averages of 25 towns attacked) . . .	1804 extremes	1 in 2·25	1 in 1·3
		1 in 13·3	1 in 6·42
	„ mean	1 in 6·42	1 in 3·087
Cadiz	1804	1 in 1·5	1 in 9·6
Gibraltar. . . .	1829	. . .	1 in 1·66
Lisbon	1857	1 in 36·363	1 in 3·09

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* For the American epidemics the authorities are La Roche, Barton, and Lallemant; for the West Indian and other commands, Sir A. Tulloch's and the Navy Medical Reports.

The above summary will enable us to compare the ratios of mortality in the Lisbon epidemic with those in other remarkable epidemics. The ratios are calculated for the mortality to the population remaining in the cities and towns attacked, so far as could be ascertained with any approach to accuracy; also for deaths to attacks.

It will be at once observed, that while there is a certain amount of general coincidence in the latter ratios, as those of deaths to attacks, the widest difference prevails between the ratios of deaths to population exposed. In this last-named respect, the Lisbon epidemic of 1857 is shown to have been a much less direful scourge to the population than any other of those with which it is compared. The maximum of deaths to population exposed, 1 in 2¼, is that in the losses of the Spanish epidemic of 1804; the minimum, 1 in 36⅓, that in the Lisbon epidemic of 1857.

The next class of questions to be considered refers to the meteorological conditions supposed to be favourable to the induction of epidemic disease.

From the records of the Royal Observatory of the Infant Dom Luiz, I was enabled, through the kindness of the Director, Senhor Pegado, to present very full details of the climatology of Lisbon for the years 1855, 1856, 1857. I owe to the same source the excellent graphic representations of the meteorological elements for the year 1857, and their relation to the rise and progress of the epidemic, which is furnished by Chart 3, Op. cit. The records of this Observatory do not, however, extend sufficiently far back to furnish us with a series of means available for the purposes of comparison. We have, therefore, to fall back on the records of private observers, amongst whom must be specially named Colonel Franzini and Dr. John Martin, the latter an English medical practitioner of long standing, and of good repute in Lisbon. To both these gentlemen I am indebted for meteorological returns, extending over a considerable period of years. The observations of Dr. Martin are of especial interest, as they have been made at nearly the level and within the districts most subject to the epidemic influences. To the zeal and industry of Dr. Martin I owe two of the most valuable of the meteorological charts which accompany this Report, which he had the goodness to draw up at my request.

As I have in Part III. of my official Report entered very fully into the consideration of the meteorology of Lisbon for the year 1857, and compared the meteorological elements of the epidemic months of that year with the similar elements of former years, so far as could be done with the data available, I must refer for full details on this important branch of the subject to the various sections of that work. I will only briefly remark here, that so far as the available data can be relied on, there is no evidence of any very unusual atmospheric disturbances having preceded the outbreak of the epidemic; nor again, during the months in which the epidemic reigned, is there to be recognised any very extraordinary departure from the meteorological conditions of the same months in former years.

The following summary contains a brief view of the most important results of the discussion of the climatology of Lisbon for 1857, as compared with preceding years.

Until a long series of observations shall have been accumulated, there does not appear to be any method of arriving at a mean of the monthly barometric pressure for Lisbon, based on sufficiently extended observations and reliable for the purposes of comparison. The monthly means for 1855, 1856, 1857, as recorded in the Royal Observatory, fail to show any very remarkable disturbances for 1857. The means for March, May, June, and August, are lower than the corresponding ones for both 1855 and 1856. The means for 1857 are greater than those of 1855 only in the months of February, October, November, and December; they are less in the other months. They are greater than those of 1856 in January, April, July, September, and December, and less in the remaining months.

The discussion of the thermometric elements for 1857 may be summed up as follows:—

DIFFERENCE IN 1857 FROM MEAN OF 16 YEARS.
FRANZINI. (CENTIGRADE SCALE.)

January.	February.	March.	April.	May.	June.
—·782	1·193	—·805	—·983	—1·61	—·638

July.	August.	September.	October.	November.	December.
+1·802	+·868	+·325	—·208	+·982	—·791

As I have elsewhere more fully considered, it will be found, I think, that there is good reason for supposing that the observations of the Royal Observatory, in consequence of its distance from the thickly inhabited parts of the city, and its superior elevation, do not accurately represent the meteorological elements of Lisbon proper. In discussing this subject, I have called attention to the great want of subsidiary stations for meteorological observations in close proximity to the Tagus. I make no doubt that ere long this want will be filled by the same enlightened patronage on the part of His Majesty Dom Pedro V., which has already so much encouraged and advanced the scientific institutions of Portugal.

The rain-fall for 1855, 1856, and 1857 appears to have exceeded the average of 16 years, as deduced from Franzini's observations, extended for the data of this element over 23 years. According to this average, the mean rainfall at Lisbon may be regarded as 23 inches, while that of 1856 and 1857 was more that 34 and 32 inches respectively. In the number of rainy days there is likewise a marked difference; thus the mean number of rainy days is given as 98, while in 1855, 1856, and 1857 it rained 171, 165, and 162 days respectively.

It is to be observed that the three years, 1855, 1856, 1857, present an extraordinary increase of rain-fall, and in a sort of descending scale from 1855. The average rain-fall at Lisbon (as above stated) is generally assumed as 23 inches (nearly). In 1855 the total rain-fall for the year was over 41 inches; in 1856 it was more than 34 inches; and in 1857 it was still over 32 inches, or about 9 inches above the average. By reference to Table A., pp. 77, 78, Op. cit., it will be found that the highest total rain-fall at Lisbon (on record) amounts to $44\frac{1}{10}$ inches, being that of the remarkable year 1785, in which rain fell on 239 days. It may also be observed, and it is a circumstance of much interest, that this large amount (that of 1785) was gradually reached as it were, there having been a progressive increase in the total annual rain-fall from 1783; and as after 1855 the total rain-fall was not reduced to the average in the succeeding year, but appears to have decreased gradually, does there exist at Lisbon a rain cycle, gradually advancing from year to year to a maximum, and then gradually falling to an average, or perhaps to a minimum? One year is recorded with only 10½ inches of rain. It may be that a succession of rainy years gradually influences the constitution of the population, till, with other concurrent causes, a climax of complicated morbid elements is brought about, which leads to the outbreak of epidemic disease. (For more full details see Op. cit. Part III. pp. 77, 78, 93.)

The following Abstract shows the more important results of the Tables referring to the Dew-point, &c. (Op. cit. Part III. pp. 95, 96, 97), compared by the means for the epidemic months, July to December inclusive, and for the years 1854, 1855, 1856, and 1857.

Means.	Dew-point.	Elastic Force of Vapour.	Vapour in Cubic Foot of Air.	Dew-point.	Elastic Force of Vapour.	Vapour in Cubic Foot of Air.	Dew-point.	Elastic Force of Vapour.	Vapour in Cubic Foot of Air.
	JULY.			AUGUST.			SEPTEMBER.		
1854	59·9	·535	5·92	60·75	·553	6·05	60·75	·557	6·08
1855	59·75	·529	6·005	60·75	·568	6·075	58·1	·504	5·615
1856	59·	·514	5·625	59·	·373	5·63	56·85	·328	5·485
1857	60·25	·540	5·83	59·2	·525	5·79	60·5	·534	5·97
	OCTOBER.			NOVEMBER.			DECEMBER.		
1854	54·95	·466	5·14	47·4	·371	4·12	42·45	·308	3·50
1855	55·05	·472	5·265	45·15	·342	3·855	46·15	·349	3·98
1856	55·45	·306	5·25	49·2	·258	4·285	46·15	·354	4·17
1857	54·1	·457	5·08	54·5	·456	5·11	50·	·411	4·62

If we compare the means for 1854, 1855, and 1856, with those for 1857, we shall obtain the following results for 1857:—

July.—There was an elevation of the dew-point in July, when it reached a maximum, 60·25, as compared with 59·75 (1855). The elastic force of vapour, ·540, was likewise at a maximum in the same month. The weight of vapour to the cubic foot of air was below the maximum in this month, as 5·83 (1857) is to 6·005 (1855).

August.—The dew-point in this month was above the minimum (59), but was below the maximum, as 59·2 (1857) is to 60·75 (1854 and 1855). The elastic force of vapour was considerably above the minimum, ·373 (1856), but below the recorded results, ·553 (1854) and ·568 (1855) respectively. The weight of vapour to the cubic foot of air was above the minimum, 5·63 (1856), but below the recorded results, 6·05 (1854), and 6·075 (1855).

September. — The dew-point was higher than in the preceding years, having reached 60·5. The elastic force of vapour was above a minimum, ·328 (1856), but below the maximum, ·557 (1854). The weight of vapour to the cubic foot of air was below the maximum, 6·08 (1854), but above that of the other years.

October. — The dew-point was at a minimum, 54·1. The elastic force of vapour, ·457, was above the minimum, ·306 (1856), but below the results of the other years. The weight of vapour to the cubic foot of air was at a minimum, 5.08.

November.—The dew-point was at a maximum, 54·5. The elastic force of vapour was likewise at a maximum, ·456. The weight of vapour to the cubic foot of air was also in excess.

December.—The dew-point, 50, elastic force of vapour, ·411, and the weight of vapour to the cubic foot of air, 4·62 were all in excess over the similar elements of the corresponding months in the previous years.

It will be observed that in 1857 the dew-point fell but 10·25 degrees from July to December. The minimum depression for the same period in the three preceding years was 12·85.

The dew-point for November and December, it will be observed, was remarkably high, 54·5 and 50 as compared with 49·2 and 46·15, the highest respectively in any of the preceding years. There is, however, no absolute relation between high dew-point and the epidemic outbreak in the preceding months.

For more complete detail on the meteorology of the epidemic months, including the ozonometric and magnetic results, I refer to Part III. of the work already cited. The combined meteorological and necrological tables at p. 81 *et seq.* of my Report, will be found to illustrate fully the daily meteorological elements, and the progress of the epidemic. The charts, giving a graphic or diagrammatic representation of the same elements, and their relation to the epidemic mortality, will also be consulted with interest.

Finally, I wish it to be observed that here, as elsewhere, I purposely avoid specifying any one cause, or indeed any combination of causes, as that to which the origin of the Lisbon epidemic is to be directly traced. I have shown that there are no grounds to substantiate the theory of the importation of the disease from abroad, while there undoubtedly existed many causes, terrene as well as meteorological, which must be regarded as potent agencies for the origin and spread of epidemic disease. But I have held it in view, as my main purpose, to illustrate, by such reliable evidence as could be obtained, *all* the conditions, local as well as climatological, which existed at Lisbon, before and at the period of the outbreak of yellow fever, in the belief that by so doing I was best providing for the ultimate solution of some at least of the great questions of epidemiology, which will hardly admit of being scientifically approached till many histories of many epidemics, with even more full details than I can offer on the present occasion, shall have been accumulated.

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